



**Walk-over Visual Inspections of Assets
including Coastal Slopes**



**Redcar and Cleveland
Borough Council
Final Report**

July- August 2014

Redcar and Cleveland Borough Council

Cell One Coast Protection Assets and Coastal Slope Condition Analysis

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	Final	November 2014	A Parsons

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Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (*Figure 1-1*). Within this frontage the coastal landforms vary considerably, comprising low-lying tidal flats with fringing salt marshes, hard rock cliffs that are mantled with glacial sediment to varying thicknesses, softer rock cliffs and extensive landslide complexes.

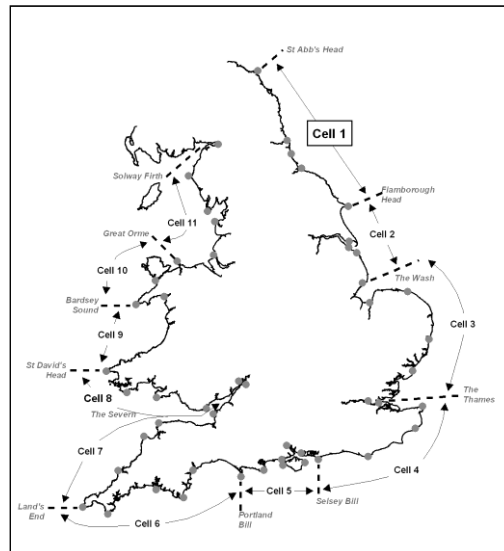


Figure 1-1: Sediment Cells in England and Wales

The work commenced with a three-year monitoring programme in September 2008 that was managed by Scarborough Borough Council on behalf of the North East Coastal Group. This initial phase has been followed by a five-year programme of work, which started in October 2011. The work is funded by the Environment Agency, working in partnership with the following organisations:



The original three year programme of work was undertaken as a partnership between Royal Haskoning, Halcrow and Academy Geomatics. For the current five year programme of work the data collection

associated with beach profiles, topographic surveys and cliff top surveys is being undertaken by Academy Geomatics. The analysis and reporting for the programme is being undertaken by Halcrow.



The main elements of the Cell 1 Regional Coastal Monitoring Programme involve:

- beach profile surveys
- topographic surveys
- cliff top recession surveys
- real-time wave data collection
- bathymetric and sea bed characterisation surveys
- aerial photography
- walk-over surveys

In addition, separate reports are produced for other elements of the programme as and when specific components are undertaken, such as beach profile, topographic and cliff top surveys, wave data collection, bathymetric and sea bed sediment data collection, and aerial photography.

The present report provides a summary of the main findings of the Coastal Walk-over visual Inspections of assets of Redcar and Cleveland Borough Council's frontage that were carried out in July and August 2014.

1. Introduction

1.1. Methodology

This section outlines the approach taken by the slope and asset inspectors, respectively, for the Redcar and Cleveland Borough Council coastal frontage, extending from the South Gare Breakwater in the north, to Cowbar Nab, Staithes in the south.

Coastal Walkover Inspections have previously been undertaken every 2 years since 2002 between Scottish Border to River Tyne, and every 2 years since 2008 between River Tyne and Flamborough Head. The most recent full inspection of the Redcar and Cleveland frontage was 2012, although selected locations were inspected shortly after the December 2013 storm surge event. The approach to the inspections undertaken in 2014 is consistent with the previous work. The asset and slope inspectors have included Chartered Engineers (focusing mainly on the built coastal protection structures) and Engineering Geomorphologists (focusing mainly on the natural cliffs and coastal slopes) ensuring suitable skills are applied to each length of frontage.

On 5th December 2013 a significant storm surge, driven by strong northerly winds, coincided with one of the highest astronomical tides of the year. A comparison of the recorded water level data for the December 2013 storm surge at North Shields, Whitby and Scarborough has been provided in the second wave data analysis report covering the period 2013 to 2014. Recorded surge residuals from that report show a similar signature at the three sites, with the maximum surge height occurring before high water and the surge increasing in height as it progressed down the coast, from around 1.3m above predicted water level at North Shields to around 1.8m at Whitby and Scarborough. Based on the EA (2011) Coastal Flood Boundary Condition extreme water level data the surge had the follow chance of occurrence each year:

- North Shields: between 1 in 200 and 1 in 500
- Whitby: between 1 in 100 and 1 in 500
- Scarborough: between 1 in 150 and 1 in 500

In the week after the storm surge, a more limited site inspection was undertaken to document damage to coastal defences and movements of beach sediment (December 2013 supplementary report). The report also described the results of post-surge beach surveys that were completed one to two days after the surge. The present report provides the first comprehensive visual inspection of the whole coastline following the storm surge, which was undertaken between August and September 2014. The longer-term impact of the surge on beaches, dunes and cliffs in the Cell 1 area has been quantified in the 2014 partial measures survey reports.

The approach to the inspections is consistent with the previous work. The asset and slope inspectors have included Chartered Engineers (focusing mainly on the built coastal protection structures) and Engineering Geomorphologists (focusing mainly on the natural cliffs and coastal slopes) ensuring suitable skills are applied to each length of frontage.

1.2. Assessment Methodology

This section presents the approach taken by the slope and asset inspectors respectively for the Redcar and Cleveland Borough Council coastal frontage.

Coastal Slope Condition Assessment (Saltburn to Cowbar)

The 2014 Coastal Slope Condition Assessment was undertaken by systematic walk-over inspection of the whole coastline by a geomorphologist familiar with the site having undertaken previous inspections in this area. The inspection involved visual assessment of cliff activity and noting specific areas of activity (e.g. landslides and tension cracks). All observations were documented with photographs and field notes. Each unit was identified, photographed and classified according to the five point activity scale as defined in Table 1.1. This classification scheme is the same as that used in previous cliff activity assessments undertaken by Halcrow for Scarborough Borough Council in Cell 1 (Halcrow 2002, Halcrow 2005, Halcrow 2010).

This report provides a summary of the cliff condition assessed in 2014, and highlights changes in activity since previous inspections. A fuller discussion of geology and specific mechanisms of cliff failure can be found in previous reports (Halcrow 2002, Halcrow 2005, High Point Rendel 2002). For ease of reference the photos presented in this report have also been bordered with the colours from the key indicated below. Maps showing current activity and change in activity since the last survey are provided in Appendix A.

Rank	Activity Class	Description
1	Dormant	Protected cliffline or landslide complex with no visible evidence of landslide activity.
2	Inactive	Relict cliffs or landslides with vegetated slopes and localised erosion of the toe or failure of the headscarp.
3	Locally Active	Retreating cliffline with localised small landslides or areas of erosion.
4	Partly Active	Retreating cliffline with very common smaller-scale landslides or areas of intense erosion.
5	Totally Active	Retreating cliff line almost entirely affected by large-scale landsliding or intense erosion.

Table 1.1. Cliff activity classes used 2014 assessment

The inspection was primarily conducted from the cliff top, due to access restrictions and health and safety concerns associated with the cliff toe and beaches along this stretch of coast. In the Redcar and Cleveland Council region, the coastline is followed for the most part by the Cleveland Way cliff top footpath. Where the footpath moved inland the inspection kept to the cliff edge to ensure the whole coastline was observed and activity recorded. The beach and foreshore were only inspected where access could be safely achieved from the cliff top.

The Coastal Slope Condition Assessment walkover survey for the Redcar and Cleveland Borough Council frontage between Cowbar Nab, Staithes in the south-east and Redcar in the north-west, was conducted on 22 August 2014. Whilst the survey was undertaken walking from Staithes to Redcar, for consistency with previous reports results are presented from north-west to south-east. The remainder of the natural coast assets between South Gare breakwater and Saltburn were inspected on 24th July 2014. The weather during this time was generally mild and dry.

Coast Protection Asset Assessment

The visual inspection of the coast protection assets was carried out on 24th July 2014 by a Chartered Engineer who was familiar with the area having undertaken the previous inspections in 2012. The inspections were planned to coincide with suitable tidal states and weather conditions. Assets were visually inspected, photographed, graded based on their condition as defined in Table 1.2 and an estimate was made of their residual life and urgency of repair work. The grading assessment followed standard Environment Agency guidelines as presented in the Condition Assessment Manual (EA, 2011).

This classification scheme is the same as that used during previous inspections. Inspections were made from both the seaward and landward side of defence where possible. All assets were photographed and all data were stored 'live' using NFCDD inspection forms within SANDS, which was loaded on a ruggedised laptop.

The asset descriptions provided give an overview of findings, summarising each locality and identifying individual assets of poor condition, failing structures and assets that have the potential to fail. It is anticipated that this will help identify areas for investment, including repair work, replacement or the installation of a different asset type. The report also highlights assets with a certain level of importance or interest.

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce performance of the asset.
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure

Table 1.2 Condition assessment grading used in the 2014 inspections

For ease of reference the photos presented in this report have also been bordered with the colours from the key indicated above. Maps showing current asset condition grade are provided in Appendix B.

1.3. Study Area

This report documents the condition of the coastal cliffs and built and natural assets along Redcar and Cleveland Borough Council's frontage, which extends from the South Gare Breakwater in the north, to Cowbar Nab, Staithes in the south. An overview of the study area is provided in Figure 1-1 below, which also shows the SMP2 Management Areas. Detailed maps of the cliff units are in Appendix A and the built assets in Appendix B.

The majority of the frontage between the River Tees and Saltburn is characterised by natural undefended coastal slopes of varying profile and level, with extensive concrete and masonry sea defences at Redcar and local defences at Marske-by-the-Sea and Saltburn. South of Saltburn the frontage is characterised by slope-over-wall cliffs comprising Lower Jurassic Lias clays and limestones overlain by glacial sediments. Between Skinningrove and Boulby the natural cliffs are largely replaced by extensive abandoned quarries cut back into the coastline. In places, the quarries are steep and extend down to sea level. East of Boulby the cliffs are lower, with the clear stratigraphy of the Lower Jurassic Lias rock and glacial sediment evident again.

The naming convention for CBUs in this region is as follows: For CBU E59/6 the prefix relates to FutureCoast unit E59 and the suffix 6 relates to the specific area as defined in this case by the headland at Redhouse Nab (between Boulby and Cowbar).

The built coastal defence assets are named using the system established within the National Flood and Coastal Defence Database (NFCDD), as used on the previous surveys of this frontage.

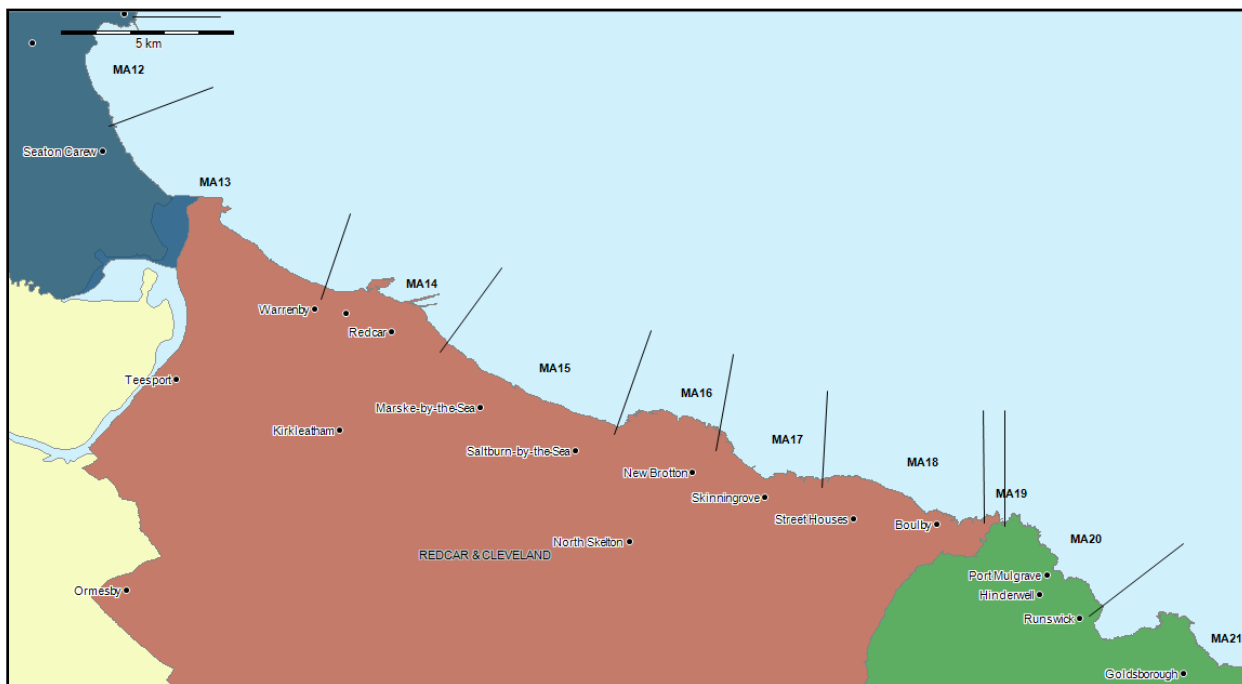


Figure 1-1: Study Area showing SMP2 Management Areas

2. Overview

2.1 Coastal Slope Condition Assessment

Variation in activity levels observed within this area reflects the diverse geology, past landslide activity and history of land-use.

In total 60 CBUs were observed during the 2014 walkover, of which, two were classed as Totally Active, 31 as Partly Active, 19 as Locally Active, five were Inactive and three units were Dormant (Figure 2-1). The principal asset at risk along the natural stretch of coastline is the Warsett Hill railway line, which provides the rail link to the Boulby Potash mine. In addition, there are occasional properties and the Cleveland Way cliff top footpath.

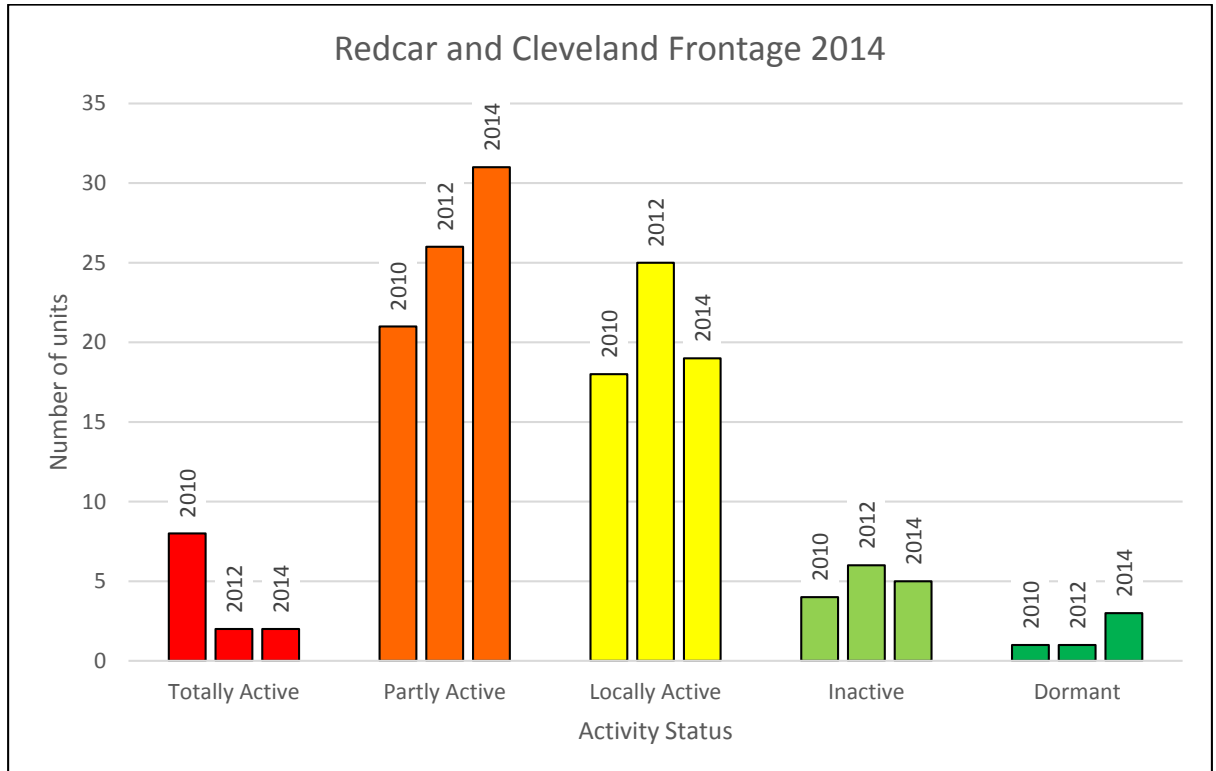


Figure 2-1. Frequency of cliff activity along the Redcar & Cleveland frontage in 2014

As in 2012 of particular concern is the activity observed at the following locations:

- Hunt Cliff and Warsett Hill where the railway line runs close to the cliff edge.
- Between Boulby and Cowbar where intense erosion was observed and parts of Cowbar Lane continue to be lost. Setback of the road has been necessary. This poses a significant risk to local traffic as it is the only access road to Cowbar.
- Boulby Grange, where the cliff top has shown recession and may begin to threaten the Cleveland Way footpath.

Regular monitoring of these sites is recommended.

2.2 Coast Protection Asset Condition Assessment

As identified in the 2008, 2010 and 2012 inspections, the South Gare Breakwater at the northern end of Coatham Sands (Asset Ref No 1221C901C0506C01) remains in poor condition and despite further recent patchwork repairs is still deteriorating. A detailed survey of the structure was recommended in the 2010 report, and if not yet undertaken is still required. This needs to identify if continuing local, isolated repairs are sufficient or whether a broader strategy/scheme which considers the condition and performance of the whole structure is more appropriate.

The assets protecting the Redcar frontage were not inspected in the 2010 or 2012 inspections as extensive Environment Agency funded capital works to upgrade the 2.7km of assets from Coatham to the eastern extent of The Stray were underway. These new defences were in very good condition at the time of the July 2014 inspections. However, the seawall at Coatham (Asset Ref No 1221C901C0601C01) was not included in the scheme and remains in fair condition, but it appears low and must be heavily overtopped during storms. Although much of the area behind is car parking, the new leisure complex between the seawall and Majuba Road appears at significant risk.

The timber groynes in front of the new blockwork revetment along the Stray to the east of Redcar (Asset Ref No 1221C901C0603C01) were in poor condition in 2008 and 2010 inspections but were renovated / refurbished as part of the improvement works in 2012/13. Some of the refurbished groynes were observed to have missing planks, particularly towards their seaward ends and require repairs.

The previous inspections in 2008, 2010 and 2012 all noted that the masonry seawall protecting much of the frontage at Saltburn (Asset Ref No's 1221C901C0703C02 to 1221C901C0704C06) required repointing in places and repairs to minor defects. Significant repairs and repointing had been undertaken prior to the 2014 inspection, possibly in response to damage that occurred in the December 2013 storm surge. East of Skelton Beck the ad-hoc repairs to the eastern section of defences noted in 2010 and 2012 were holding, but there are still major defects.

At Skinningrove, the jetty continues to deteriorate (Asset Ref No. 1221D901D0201C02). Although it is disused as a jetty, access is still possible and so consideration should be given to public health and safety and as previously recommended the jetty should be secured to prevent public access. The beach levels at Skinningrove were higher than during the 2012 inspection and the undermining seen in 2012 to some of the rock armour defences between the jetty and the village, (Asset Ref No. 1221D901D0202C01) was not visible. Although there was no notable movement in the armour, it had been undermined in places and so vulnerable to storm damage. At the eastern side of Kilton Beck the wall (Asset Ref No. 1221D901D0202C03) protecting the road where it turns inland remains in poor condition, despite repairs to the crest as the low beach levels were exposing the toe which is significantly undermined.


3. Condition Assessment

This section provides an account of observations made on the condition of cliffs and coastal assets within Redcar and Cleveland Borough Council's coastline, running from north to south.

Coastal Slope Condition Assessment

Brief descriptions and photographs are provided, with reference made to groups of CBUs of similar activity. Location and activity status of all CBUs in the study area are shown on maps 1 to 4 in Appendix A. These maps also show change in activity.

Photographs have been bordered with colours in order to show their activity status, as follows:

	Totally Active
	Partly Active
	Locally Active
	Inactive
	Dormant

Coast Protection Asset Condition Assessment

Brief descriptions and photographs are presented for key assets and those where there are significant defects or where the condition has changed significantly since the previous inspection. Photographs have been bordered with colours in order to show their condition as follows:

	5 – Very poor
	4 – Poor
	3 – Fair
	2 – Good
	1 – Very good

Coast protection asset condition data is also provided on Maps 1 to 4 in Appendix B, and these also highlight any changes in overall asset condition since 2012. A full assessment of coast protection asset condition has been entered into NFCDD inspection forms held in the SANDS database.

3.1 Coatham Sands

Coastal Slope Condition Assessment

As reported in 2008, 2010 and 2012 inspections, the sand dunes (E52/11) were generally stable with a good coverage of established vegetation. Minor erosion, loss of vegetation and lowering of dune crests was evident locally where members of the public access the beach most frequently (the northern and southern extents of the dunes). A healthy beach level was maintained throughout Coatham Sands.



E52/11 View towards Redcar from South Gare.
(Inactive)



Narrow dune ridge near caravan park



E52/11 view from south - Photo from 15/10/2012
(Inactive)



E52/11 Further accretion and roll back of dunes
next to former site compound at Coatham

Coast Protection Asset Condition Assessment

The northern extent of the Redcar & Cleveland frontage is marked by the South Gare Breakwater, see Map 1 in Appendix B.

In the 2010 inspections the structure was noted as being generally in a poor condition throughout with significant cracking, spalling, loss of mortar and sealant and exposure of reinforcing steel to many of the concrete and masonry elements and undercutting and local slumping of the slag embankments. The 2014 inspection found that as with the 2012 inspection there was evidence of relatively recent patch repairs, but the overall condition remains poor.

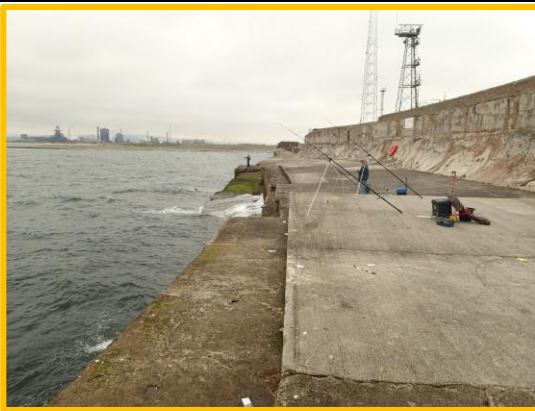
Although structure remains in poor overall condition, it continues to function in protection of the navigation channel and control of bay to south. There was evidence of recent repairs to grouted revetment on the west side and concrete deck slabs on south side.



Patchwork of repairs on west side of South Gare Breakwater, (Asset Ref No 12221C901C0506C01)



Patchwork of repairs on east side of South Gare Breakwater, appear to be holding but facing to outer structure missing (Asset Ref No 12221C901C0506C01)



View of east side of South Gare breakwater. (Asset Ref No 12221C901C0506C01)



Slag bank running south east from South Gare with debris from failed sections of breakwater (Asset Ref No 12221C901C0506C01)

As noted in previous reports, a detailed survey of the structure is beyond the scope of the present inspections and a full structural survey of the breakwater is recommended in order to establish the full extent of the damage and identify appropriate remedial works.

To the west of Redcar, a grouted stone revetment with a concrete wall along the crest tie into the dunes to the north of the Coatham Sands car park (see photo below). While there appears to have been accretion of the dunes and roll-back to cover sections of the fence at the former contractor's compound (see E52/11 above) there is extensive damage to the vegetation due to pedestrian trampling, which will be exacerbating wind blown sand problems.



Overview of defences at west of Redcar from east end of sand dunes.
(Asset Ref No 12221C901C0601C01)

The concrete wall with grouted stone revetment, 1221C901C0601C01, remains in fair overall condition although there are a number of missing blocks and areas of grout loss. Much of the revetment was covered by the high beach levels, which give it some protection. There is still a missing section of crest wall towards its western extent, as noted in the 2010 and 2012 inspections, see below left and right. This appears to concentrate overtopping and drainage flows, resulting in a loss of beach material and exposure of the revetment. Further east the promenade was flooded, presumably due to wind blown sand and high beach levels blocking the drainage, lower left. At the eastern end of this asset the construction of the new Redcar seawall was progressing well and the interface with the new wall is shown below lower right.



Gap in concrete wall and exposed revetment
(Asset Ref No 12221C901C0601C01)



Damaged area of revetment
(Asset Ref No 12221C901C0601C01)



Damage at access ramp adjacent to west extent
(Asset Ref No 12221C901C0601C01)



Interface with new seawall at the eastern end of
Asset Ref No 12221C901C0601C01

3.2 Redcar

Coastal Slope Condition Assessment

There are no coastal slopes along the defended length of frontage at Redcar.

Coast Protection Asset Condition Assessment

The major Environment Agency funded capital works to upgrade the 2.7km of assets from Coatham to the eastern extent of The Stray were completed in 2013. The new defences follow similar alignments to the previous assets and so, for the purpose of this report, the original NFCDD references have been retained. In the accompanying SANDS database the GIS line-work has been amended to the revised extents. The assets were generally in very good condition with just a few minor defects noted.



New stepped revetment and wave wall at west end of Redcar, Asset ref. 1221C901C0602C06



Promenade and wave wall in very good condition, Asset ref. 1221C901C0602C06

The seawall structures (Asset 1221C901C0602C05) protecting the old cinema building that is built on the beach have not been renewed as part of the recent scheme and have a number of defects including cracking and undermining of the apron on the north west corner.



Undermining of toe apron at cinema seawall
Asset ref No. 1221C901C0602C05



Interface between new seawall and cinema wall,
Asset ref Nos. 1221C901C0602C05 & 6

The beach levels were noted as being high to the west of the Beacon promontory, (see photo below left), with levels falling to the east, such that the toe apron of the smooth revetment at the boat park slipway (Asset ref No. 1221C901C0602C02) was exposed (see photo below lower right).



High beach levels to east of cinema
Asset ref No. 1221C901C0602C04



New vertical wall at the Beacon tower
reconstructed in 2012,
Asset ref No. 1221C901C0602C03



Localised damage to slipway at the RNLI building
Asset ref No. 1221C901C0602C02



Low beach levels adjacent to boat park slipway
Asset ref No. 1221C901C0602C02

Beach levels were higher in the lee of Redcar Rocks, towards the eastern extent of the main Redcar seawall, see photographs below. The defences here remain in very good condition.



Stepped seawall and wave wall in very good
condition. Asset ref No. 1221C901C0602C01



View of eastern end of main Redcar Seawall.
Asset ref No. 1221C901C0602C01

3.3 East Redcar to Saltburn-by-the-Sea

Coastal Slope Condition Assessment

The CBU's between Redcar and Saltburn show evidence of recent instability.

Unit **E52/10** was upgraded from Locally Active to Partly Active during the December 2013 inspection as the whole unit was showing signs of erosion, particularly on the subtle headland within the unit. This continues to be the case and the status of Partly Active has been retained.

The cliffs in Units **E52/9** and **E52/8** are afforded some protection by the wide beach at the toe, particularly at **E52/9** where there is a substantial coarse (cobble-size) fraction in the beach material. Unit **E52/9** was downgraded during the December 2013 survey to Inactive status and **E52/8** remained as Locally Active due to localised evidence of toe erosion, although this is very limited. Following the 2014 survey, both units have retained the statuses allocated to them in December 2013.

Immediately to the north of Marske, **E52/7** is classified as Dormant as it is defended at its toe by low level sand dunes and a series of masonry and concrete walls and shows no evidence of landslide activity.

At the headland at Marske, **E52/6** there are low accreting dunes protecting the cliff toe and the unit is therefore classified as Inactive.

From Marske to Saltburn the crest level of the coastal slopes increases and the slopes increasingly active. **E52/5** shows evidence of toe erosion and localised activity in the upper slopes and is classified as Locally Active, whereas erosion of the toe and mudsliding is more widespread in **E52/4** which is classified as Partly Active.



E52/10 Eroding till cliff (Partly Active). Photo August 2014



E52/9 Cobble beach gives protection to low and well vegetated cliff (Inactive). Photo August 2014



E52/6: Sand dunes and walls to toe of vegetated slope (Dormant) Photo August 2014

E52/8: Low, well vegetated cliff but with some localised toe erosion (Inactive). Photo August 2014



E52/6: Well Vegetated coastal slopes (Inactive)
Photo August 2014



E52/5: Coastal slopes viewed looking south
(Locally Active) Photo August 2014



E52/4: QWestern end of unit - coastal slopes
viewed looking northwest west (Partly Active)
Photo August 2014



E52/4: Eastern end of unit - coastal slopes viewed
looking north west from Saltburn (Partly Active)
Photo August 2014

Coast Protection Asset Condition Assessment
Refer to Map 2 in Appendix B.

The defence to the east of Redcar along The Stray to Mill Howle (Asset ref No. 1221C901C0603C01) was reconstructed in 2013 as part of the Redcar Coastal Defence Scheme. It consists of a new concrete block revetment and concrete promenade, with the original low wave wall at the rear (see photographs below). The groyne along this frontage were refurbished in 2012/13, but it was noted that there was some damage such as missing planks, particularly towards the seaward ends, requiring repairs (see below upper right). At the south end of the seawall there was a partial blockage to the storm outfall grating that required clearing (photo below lower right).



Concrete block revetment and concrete promenade in very good condition. Asset ref No. 1221C901C0603C01



Many groynes refurbished in 2012 have missing planks. Asset ref No. 1221C901C0603C01



View towards eroding cliff at east end of seawall Asset ref No. 1221C901C0603C01, (with 1221C901C0701C01 in distance)



Partly blocked outfall at south east end of seawall Asset ref No. 1221C901C0603C01

The coastal defences at Marske are protected by a wide beach and so only exposed to marine action during storm events. The low masonry wall and revetment (Asset Ref No 12221C901C0702C03) around the headland to the north west of the beach access at Marske was largely covered by high beach levels, but where exposed was in fair condition, although as identified in previous inspections there were some missing coping blocks and there was evidence of lateral movement / settlement of the wall. The concrete wall (Asset Ref No 12221C901C0702C03) at the toe of the vegetated slope was reported as cracked through its full height in the 2008 and 2010 inspections but the defect appeared to be of the same width and extent when inspected on 15/10/2012 and 24/07/2014. The slope above (CBU E52/7) showed no evidence of recent movement or any placement of excessive loading on the structure.



Missing coping blocks and open joints in masonry blockwork in wall below path. (No change from 2012) (Asset Ref No 12221C901C0702C03)



Missing mortar in joints and vegetation growth. (Asset Ref No 12221C901C0702C03)



Crack in concrete wall below coastal slope (Asset Ref No 12221C901C0702C03)
Photo from 2010 report.



Crack in wall no change from 2010– photo from 24/07/2014. Note lower beach levels. (Asset Ref No 12221C901C0702C03)

The masonry revetment (Asset Ref No 12221C901C0702C02) on the north west side of the beach access at Marske was reported in poor condition with extensive loss of blocks and erosion of the material below in the 2010 inspections. Vegetation growth has obscured a large proportion of the structure in 2012 and 2014. Where visible the wall appeared in fair condition and there appear to have been some localised repairs since 2012, so the overall condition assessment has been changed to fair. The masonry wall below the revetment shows evidence of local settlement although this was observed in 2008 and 2010, suggesting the structure is stable. There had been repairs to some of the inner sections.



Extensive vegetation growth on revetment; (Asset Ref No 12221C901C0702C02)



Wall enclosing fishing boat park (Asset Ref No 12221C901C0702C02)

The masonry wall to the southeast of the beach access at Marske (Asset Ref No 12221C901C0702C01) has settlement cracks and missing bricks to the seaward end. However it is in very similar condition to that reported in 2008, 2010 and 2012.



Photo from 2012 Report
(Asset Ref No 12221C901C0702C01)



Missing masonry at seaward end of wall to southeast of beach access. (Asset Ref No 12221C901C0702C01)

3.4 Saltburn-by-the-Sea

Coastal Slope Condition Assessment

The CBUs in and around Saltburn-by-the-Sea do not show much evidence of recent instability.

Units **E52/3b** and **E52/3a** above Saltburn Sands are again classified as Inactive in 2014, unchanged since December 2013. These units are defended at the toe by a sea wall and are well vegetated. Several unvegetated areas where shallow failures had exposed underlying material were noted in December 2013, but these do not appear to have developed since.

E52/3a has been downgraded from Inactive to Dormant in 2014 due to a lack of evidence for failures in this section of cliff.

CBU **E52/1** shows a little more activity, with loose materials and localised erosion at the head of the large mound situated just east of Saltburn Gill. However, the activity is minimal and this unit has been downgraded from Locally Active to Inactive in 2014.

CBU **E53/5** was classified as Locally Active in 2012 due to shallow slumping which occurred on the cliff face and the unit was reclassified as Locally Active. The slumping has occurred despite the presence of toe protection and probably occurred in response to the wet weather experienced in the latter half of 2012. Evidence of activity still remains, so a status of Locally Active has been retained for this unit in 2014.



E52/3a the stabilised slopes close to the Cliff Lift (Inactive) Photo August 2014

E52/3b from the stable and well vegetated cliffs above Saltburn Sands (Inactive). Photo August 2014



E52/2 the stable cliffs below marine parade (Inactive) Photo August 2014



E52/1 looking up at well vegetated cliffs from Saltburn Sands (Inactive) Photo August 2014



E53/5 slumped in 2012, leaving open cracks in the cliff face which are still visible. Locally Active. Photo August 2014

Coast Protection Asset Condition Assessment

A 600m long masonry seawall protects much of the frontage at Saltburn. This comprises several NFCDD assets, running from 1221C901C0703C02 at Hazel Grove Foot in the west, through 1221C901C0704C04, which is the Lower Promenade, to the ramp east of the pier, followed by 1221C901C0704C01 and then finishes with 1221C901C0704C06 at Skelton Beck, see Map 2 in Appendix B. The beach in front of the seawall consists of a mixture of sand and gravel with shingle / gravel deposits located at the toe of the wall throughout most of its length.

The outfall that exits at Hazel Grove Foot is protected by a trash screen, which was partially blocked at the time of the 2010 and 2012 inspections. It was clear at the time of the 24 July 2014 inspection, see below right and although the channel onto the beach from the outfall appeared lower, the immediately adjacent beach in the small bay was higher. The missing blocks and damage to the coping at the eastern beach access ramp noted in 2012 were not changed, but it is still recommended that this should be addressed to avoid the damage expanding.



Partially blocked outfall exiting through sea wall at Hazel Grove **Photo from 2012 report**
(Asset Ref No 1221C901C0703C02)



Outfall exiting through sea wall at Hazel Grove
sea wall at Hazel Grove Foot 24 July 2014
(Asset Ref No 1221C901C0703C02)



Missing coping stones at edge of ramp at Hazel Grove Foot (Asset Ref No 1221C901C0703C02)



Eroding cliff (E52/4) adjacent to ramp at the north of Hazel Grove Foot, (Asset Ref No 1221C901C0703C02).

The main section of wall, (Asset Ref No 1221C901C0704C04) is in good overall condition, but has abrasion damage near the toe in places and requires repair to a number of minor defects. There have been a number of repairs undertaken to replace missing mortar in blockwork joints throughout and this is particularly notable at the beach ramps which are believed to have suffered damage during the December 2013 storm.



Example of area where blockwork has been recently repaired (Asset Ref No 1221C901C0704C04)



Damaged section of coping towards western end of wall (Asset Ref No 1221C901C0704C04)



General view of wall looking south east (Asset Ref No 1221C901C0704C04)



Loss of filler below steps requires re-pointing (Asset Ref No 1221C901C0704C04)

To the south east of the pier, asset Ref. No. 1221C901C0704C01 is a section of masonry blockwork revetment adjacent to the car park area. This is in overall good condition with no missing blocks. One large section has been repaired using smaller blocks. Most mortar joints were in good condition but there was some missing mortar in localised areas. The slipway joints noted to be poor in 2012 had been repaired. The steps to the beach area to at the south end noted to be in poor condition in 2012 had been repaired, but new cracks were opening up beneath the treads.



Repaired steps to beach have cracks beneath treads (Asset Ref No 1221C901C0704C01)



View of sloping masonry revetment at car park area. (Asset Ref No 1221C901C0704C01)

Asset 1221C901C0704C06 is the concrete blockwork seawall and associated elements immediately adjacent to both sides of Skelton Beck. This remains in fair overall condition with joint washout and cracking visible and a short section of coping stone missing, as in 2012. At the time of the inspection the wall was protected by the high beach level in this area.

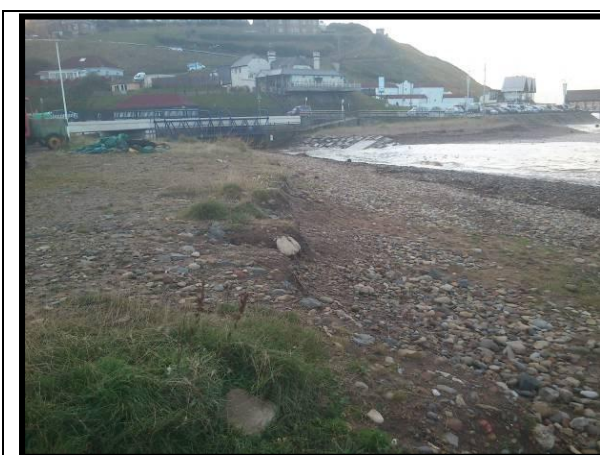


Damage to coping stones to edge of path by road. (Asset Ref No 1221C901C0704C06)



Lower beach levels to east side of beck had exposed the crest of the rock armouring (Asset Ref No 1221C901C0704C06)

Asset ref. 1221C901C0704C02 is the frontage to the east of Skelton Beck at the boat park. This is classed as undefended in NFCDD, with protection relying on the shingle bank on top of which the boat park is located. The shingle bank was lower than in 2012, exposing the edge of the boat park surfacing.



Evidence of previous storm damage to shingle bank at boat park Photo from 2012 report (Asset Ref No 1221C901C0704C02)



Erosion of cobble bank adjacent to boat park. Asset Ref No 1221C901C0704C02

To the south of the boat park the defence asset 1221C901C0704C03 is a set back wall protected by a cobble beach. The set back wall in good overall condition, although there is some cracking and loss of render. The slipway at the east end which was noted as being undercut by erosion in 2012 has been fully repaired and was in good condition.



Set back rendered wall protected by shingle beach (Asset Ref No 1221C901C0704C03)



Repaired slipway at east end of Asset Ref No 1221C901C0704C03

The most southerly section of coastal defences at Saltburn is Asset Ref. 1221C901C0704C05. This is a patchwork of informal defences protecting the public house and land to the east side of the slipway. Here, in 2008, the coastal protection consisted of heavily eroded sections of concrete defences, displaying large amounts of excavation, undercutting, major cracking and in some parts, total collapse (Asset Ref No. 1221C901C0704C05). In 2010 it was observed that large scale emergency repairs had been completed, but that these works did not appear to have been carried out by professional contractors and the condition rated as poor. The 2012 inspection found that the previous repairs were in a similar condition, with overall asset condition poor, see photos below. At the time of the July 2014 inspections it was observed that further repairs had been undertaken, although higher beach levels were covering the defence toe and probably concealing undermining that would be susceptible to damage during storms, so the overall condition rating was kept as poor.

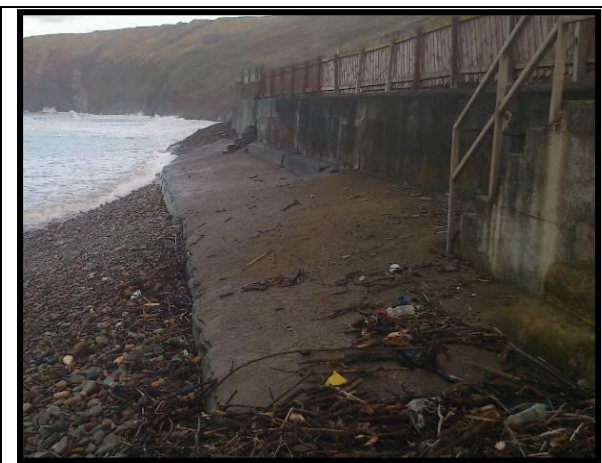


Photo from 2012: Some accretion of cobbles, defence in similar condition to 2010 (Asset Ref No. 1221C901C0704C05)



Higher beach levels at time of 2014 inspection affording some protection to defence. (Asset Ref No. 1221C901C0704C05)



Poured concrete repairs at east end of defence adjacent to slumping cliffs
(Asset Ref No. 1221C901C0704C05)



Low wall at edge of pub car park in fair condition
(Asset Ref No. 1221C901C0704C05)

3.5 Cliffs northeast of Saltburn

Coastal Slope Condition Assessment

Northeast of Saltburn the cliffs have a slope-over-wall form, with a weak till overlying a steep hard rock cliff. The till is subject to periodic mudslides, which result in material falling over and staining the cliffs and deposition of a debris apron along the cliff toe. The debris apron is partly-vegetated, indicating periodic activity in the form of wave erosion and debris falls.

Unit **53/4** has been subject to recent localised mudsliding in the till cliffs. The unit therefore remains classified as Partly Active in 2014, unchanged from December 2013.

Unit **53/3 and 53/2** also have a slope-over-wall form. The units are classified as Locally Active (53/3) and Partly Active (53/2) reflecting the degree of mudslide activity in the till and wave erosion of the resulting debris cones. The Partly Active unit (E53/2) is characterised by widespread mudslide activity in the till. These units are unchanged in 2014, from the statuses allocated in 2012

Unit **53/1** is showing signs of mudsliding in the upper till section and is classified as Locally Active in 2014, unchanged since 2012.



E53/4 Slumping in the till layer of the cliff northeast of Saltburn (Locally Active). Photo August 2014



E53/3, E53/2 (Partly Active) and E53/1 The rock part of the cliff is steep and exposed. The till part is much shallower and vegetated (Locally Active). Photo August 2014



E53/2 Evidence of previous instability in the upper till section of this unit (Locally Active). Photo August 2014

Coast Protection Asset Condition Assessment

There are no coastal assets within this area.

3.6 Hunt Cliff and Warsett Hill, west of Skinningrove

Coastal Slope Condition Assessment

The cliffs are characterised a slope-over-wall form, comprising vertical rock cliffs capped by weaker till. There is evidence of localised and recent rock fall activity in the cliff and mudsliding.

These high, steep cliffs were all classified as Partly Active during the 2012 walkover survey. Units **E54/3a** and **E542/a** and remain classified as Partly Active following the 2014 survey.

Unit **E54/4** has some vegetation on the debris apron and an exposed rock cliff face above. It is classified as Partly Active, unchanged since 2012

Unit **E54/3b**, has some areas of vegetation and stability but overall the cliff face is composed of exposed rock. It is classified as Partly Active, unchanged since 2012.

Unit **E54/3a**, the railway line runs very close to the cliff edge as it curves around Warsett Hill within this unit. The photograph shows that the footpath and fencing is getting close to the edge of the cliff. It is classified as Partly Active, unchanged since 2012.

Unit **E54/2b** and **E54/2a** have a bare rock cliff face and is showing signs of continued erosion. Both are classified as Partly Active, unchanged since the 2012 survey.



E54/4 looking northwest along Hunt Cliff showing active cliff face and debris apron (Partly Active) Photo August 2014



E54/3b looking southeast along Warsett Hill (Partly Active) Photo August 2014



E54/3a proximity of footpath and railway line to actively eroding cliff top (Partly Active) Photo August 2014



E54/2b some vegetation cover on the upper part of the cliff, looking west (Partly Active) Photo August 2014



E54/2b and MU54/2a – looking east. Note very sharp, actively eroding cliff line (Partly Active)

Coast Protection Asset Condition Assessment
There are no coastal assets within this area.

3.7 Cattersty Cliff and Skinninggrove

(Map 1 – Saltburn to Cattersty Cliffs, Coastal Slope Condition 2012 and Map 2 – Cattersty Cliffs to Loftus Alum Quarries, Coastal Slope Condition 2012)

Coastal Slope Condition Assessment

The cliffs in this area reduce in height towards Skinninggrove and are generally less active than those around Warsett Hill. They have a characteristic slope-over-wall form, comprising a thin layer of till overlying the hard rock cliff.

E54/1, is characterised by a vegetated layer of till, which sits above the Lower Jurassic bedrock. Lower down the cliff, the cliff face is largely obscured by periodically active debris lobes that are undergoing marine erosion at the toe. This unit was classified as Locally Active in 2014, unchanged since 2012.

Units **E55/3**, **E55/2** and **E55/1** have a small, steep debris apron that is sparsely vegetated. Most of the debris apron shows evidence of recent activity and is subject to on-going toe erosion. The till in the upper cliff is subject to localised mudslide development and headscarp recession. These units are Partly Active in 2014. **E55/3** has been upgraded from Locally Active to Partly Active in the 2014 survey. **E55/2** and **E55/1** remain unchanged since 2012.

Unit **E56/2a** and **56/2b** are above Cattersty Sands (immediately west of the jetty). Both units are Locally Active in 2014, unchanged since 2012. The cliffs here have a shallower gradient with extensive vegetation cover. They are also provided protection at their base by a set of embryo dunes. The development of these dunes and lack of erosional activity within this unit is due to the protection afforded by the adjacent jetty. However, it was noted in 2014 that new steps have been put on the cliff to take the Cleveland Way across a failure scarp from the mid cliff to the cliff top.

Unit **E56/1** is located to the east of the jetty and adjacent to the mouth of the beck. The slopes within this unit are well-vegetated. There is some evidence of recent sliding activity at the cliff toe and in the mid-cliff, despite the rock armour defences, and this unit is classified as Locally Active in 2014, unchanged from 2014.



E54/1, E55/3 and E55/2 and E56/2b looking northwest (Locally Active)



E56/2a (west) Well vegetated cliff but new steps in on Cleveland Way footpath have been put in to cross failure scarp (Locally Active)



E56/2a (east) – Locally Active

E56/1 the old stepped system has now vegetated and stabilised (Locally Active)



E56/1 – Numerous shallow failures visible. Locally Active

Coast Protection Asset Condition Assessment

In this area there are coastal defences around Skinningrove village, located to the east of the original mining breakwater (or 'jetty') which is some 400m northwest of the village, see Map 3 in Appendix B.

Although Skinningrove Jetty (Asset Ref No. 1221D901D0201C02) is redundant for its original purpose and is in a failing state, the massive structure provides some coastal stabilisation, fixing the orientation of the adjacent bay to the east and giving some protection to Skinningrove Village to the south east. It also helps hold the beach in front of the undefended cliffs to the west. There are gates to restrict public access to the unsafe structure, but, as seen in 2012, at the time of the inspection (27/07/2014) they were open. It is recommended that they are secured to prevent access by the public to this unsafe structure. The jetty is constructed of concrete and sheet piles and shows evidence of significant cracking, deformation and corrosion and significant sections of the structure are missing or collapsed (Asset Ref No. 1221D901D0201C02).



View of Jetty in 2012 (Asset Ref No. 1221D901D0201C02)



View of Jetty 24/07/2014 (Asset Ref No. 1221D901D0201C02)



View of crest from access gate showing missing section of crest wall.
(Asset Ref No. 1221D901D0201C02)



Voiding and collapse of west side of jetty structure (Asset Ref No. 1221D901D0201C02)

The rock armour defence between Cattersty Jetty and Skinningrove village, (Asset Ref No 1221D901D0202C01) was noted as being at risk of toe scour and undermining in the 2012 report due to the low beach and the crest rubble, placed to fill voids in the main armour and reduce risks to the public had been displaced and deformed by wave overtopping. The beach was slightly higher at the time of the 24 July 2014 inspection with the toe only exposed for a short length towards the south eastern end. Recent work had been undertaken to re-profile the smaller rock at the crest.



Photo from 2012 report showing low beach levels have exposing toe of rock armour to scour damage (Asset Ref No. 1221D901D0202C01)



Rock armour in fair to good condition (Asset Ref No. 1221D901D0202C01)



General view of revetment looking from Jetty towards village
(Asset Ref No. 1221D901D0202C01)



Rubble fill at crest has been reprofiled
(Asset Ref No. 1221D901D0202C01)

There were improvement works to the rock armour defences in the beck including construction of a spur section to reduce the wave scouring in the beck and widen the channel to the bridge in around 2004. As found in the 2010 and 2012 inspections, in general the rock armour to the north side of the beck (1221D901D0202C02), including in front of Marine Terrace, still appears to be mostly tightly packed and does not appear to have suffered from significant deformation or rock displacement, although some gaps were noted in the armour so it has been downgraded from good to fair. The low beach levels at the spur groyne noted in 2012 exposing the wrap around geotextile toe at the spur section to damage and potential undermining, had recovered with build-up of a cobble beach in the area, see below right.



Photo from 2012: Exposed geotextile matting at rock armour toe. (Asset Ref No. 1221D901D0202C02)



Cobble beach has accreted around the spur groyne at end of the beck (Asset Ref No. 1221D901D0202C02)



Rock armour and low sea wall in front of properties (Asset Ref No. 1221D901D0202C02)



View of rock armour from near car park (Asset Ref No. 1221D901D0202C02)

Defence asset no 1221D901D0202C05 which includes both the fishtail groyne and the rock armour revetment running through to the bridge on the east side of Kilton Beck remains in fair overall condition. The fishtail breakwater itself is in fair to good overall condition with signs of rock armour having been displaced locally, leaving loosely packed areas, but still serving purpose. As in 2012, the top of the navigation marker was missing and still needs repair. This asset also includes the slipway running from the boat park to the west side of the fishtail groyne. The missing section of concrete near the top of the slipway noted in 2012 had been replaced.



Seaward end of fishtail breakwater showing damaged navigation marker (Asset Ref No. 1221D901D0202C05)



Area of displaced and loosely packed armour on seaward side of fishtail (Asset Ref No. 1221D901D0202C05)



Slipway from boat park **Photo from 2012.** (Asset Ref No. 1221D901D0202C05)



Slipway with repaired section near crest. (Asset Ref No. 1221D901D0202C05)

East of the breakwater there are two further assets, a shingle ridge with boulders at the back along the edge of the boat park (Asset Ref No. 1221D901D0202C04), and a concrete wall (Asset Ref No. 1221D901D0202C03).

The shingle ridge, which is artificially stabilised by the fishtail groyne, was in good condition with high crest and gentle seaward slope. It has some rock armour at the crest. The adjacent wall, Asset Ref No. 1221D901D0202C03, which is next to the road is still in poor condition. The toe was exposed due to low beach levels and it has been significantly undercut, particularly towards the east. The crest / promenade area has been repaired and the retaining wall which was badly cracked has been shored up (see photo lower right). However, due to the toe being undermined and the whole structure at risk of collapse the overall condition of poor is retained.



Photo from 2012: Shingle ridge with boulders to rear protecting boat park. (Asset Ref. No 1221D901D0202C04)



Shingle ridge photo from 24/07/2014. (Asset Ref. No 1221D901D0202C04)



Undermining of wall toe exposing deep voids. (Asset Ref No. 1221D901D0202C03)



Wall crest showing repairs and eroding cliff to east in background. (Asset Ref. No 1221D901D0202C03)

3.8 Skinninggrove to Boulby

Coastal Slope Condition Assessment

Many of the cliffs in this area have been subject to alum quarrying of their uppermost sections, resulting in a characteristic excavated upper part and a natural lower part. In some parts, the whole cliff face has been subject to quarrying and the coastline is formed in quarry waste.

To the west of The Warren, the cliffs are characterised by an upper till layer with some vegetation cover and localised mudsliding and consequent recession at the headscarp. The lower rocky cliff is free of vegetation and has evidence for on-going erosion.

Unit **E57/7** has widespread erosion with limited vegetation cover. Unit **E57/6** is a high rock cliff with a thin cap of till above. Both parts show erosional activity, particularly the lower cliff and are classified as Partly Active in 2014, this is an upgrade from Locally Active for **E57/6** since 2012 but no change for **E57/7**.

Units **E57/5 to E57/2** form a small bay near Hummersea Scar. The units are Locally Active in 2014, due to evidence for widespread but localised erosion. These units have not changed in status since 2012.

E57/1 was classified as Locally Active in 2012, but has an intensely eroding lower cliff which forms a greater portion of the cliff's height and is therefore classified as Partly Active in 2014.

Unit **E58/6** cover a section of cliff known as 'The Warren' and represents a change in behaviour between the naturally formed cliffs to the west and the cliffs formed, at least in part, by quarrying and tipping of waste. This unit is classified as Locally Active in 2014, unchanged since 2012.

To the east of The Warren, the cliffs rise to become some of the highest in Britain. Here the cliff form owes its character to the large abandoned alum quarries which were operational in this area during the 19th Century.

Units **E58/5 to E58/2** each have an upper and lower unit. The upper parts of the quarry units are backed by steep sandstone cliffs and feature heavily vegetated, undulating terrain, possibly the product of past rockfalls as a result it is classified as Locally Active in 2014, unchanged since 2012. The lower part of the cliff is exposed to marine attack, is steep and comprises exposed shales that are heavily weathered and prone to ongoing and intense erosion. Consequently these lower units are all classified as Partly Active in 2014, unchanged since 2012.

Below Rockhole Hill there is a single unit (**E58/1c**) classified as Partly Active in 2012, and which retains this status in the 2014 survey.



E57/7 looking southeast across the bay at Skinningrove (Partly Active)



E57/6 This unit has been upgraded because the majority of the lower and mid-cliff is active and there is evidence of failure from upper cliff. (Partly Active)



Units 57/5 to 57/3 are all locally active and characterised by mudslides developed in till overlying steep rock cliffs which are undergoing toe erosion.



E57/1 (Locally Active) and E57/2 (Partly Active) – These units have an active and steep lower sea bedrock and a less active and well-vegetated, lower angle upper cliff. The lower angle, well vegetated part of E57/2 forms a much greater part of the cliff than at E57/1



Unit 58/6, The Warren has vegetated upper slopes and lower slopes formed of quarry waste over natural cliffs (Locally Active).



Unit 58/5 (West), Vegetated upper slopes and lower slopes formed of quarry waste over natural cliffs (Locally Active).



E56/5 (East) – Vegetated upper slopes and lower slopes formed of quarry waste over an active natural sea cliff.



E58/4, Upper cliff has previously been quarries but is well vegetated. Lower cliff is actively retreating due to marine erosion (indicated by arrow). Upper cliff is Locally Active, lower cliff is Partly Active.



E58/3 The upper slope is Locally Active and the lower slope is Partly Active. Note the widely spaced joint indicated by the arrow – there were several locations in this section where there were local detachments of the rear scarp occurring.



E58/2 Upper and Lower, Failed blocks litter the mid slope, which is vegetated. The lower slopes are more exposed. The Upper slopes are Locally Active and the lower slopes are Partly Active.



E58/1c – This unit has an active sea cliff (Partly Active). Also shows are E58/1b and 1c which have similar geology and morphology.

Coast Protection Asset Condition Assessment

There are no coastal protection assets within this area.

3.9 **Boulby to Cowbar Nab**

Coastal Slope Condition Assessment

In the coastal section between Boulby and Cowbar Nab the cliffs are much lower than those adjacent to the west. The majority of CBUs within this area are classified as Partly Active. They are characterised by a soft upper till unit which supports a variable vegetation cover and is subject to landsliding and consequent headscarp recession. Lower down the cliff the harder rock unit is largely bare except where covered by debris cones, reflecting localised rockfall activity.

Within unit **E58/1a** (see photos above) there have been several recent failures at the headscarp and associated cliff top recession identified during the 2014 survey. This will lead to the loss of the Cleveland Way footpath west of the buildings at Boulby Grange and may eventually threaten the properties.

An area of particular concern along this stretch is adjacent to Cowbar Lane. Here units **E59/3 and E59/4** are both classified as Partly Active in 2014, unchanged from 2012. They are characterised by an upper till unit which is undergoing severe erosion and there is evidence of recent rockfall from the lower part of the cliff. This is resulting in the loss of the now abandoned

parts of Cowbar Lane. Rock armour is also locally present along the toe of unit **E60/1b**, which is acting to protect the base of the cliffs, but is not able to prevent failures in the till materials above.



E58/1a – Example of headscarp recession encroaching onto Cleveland Way (Partly Active)



E59/9 (Locally Active) and E59/8 (Partly Active) – Limited activity at the cliff top in front of the cottages at Boulby which increases south-eastwards.



E57/7 to E59/5 looking towards Boulby from Staithes (Partly Active).



E59/5 and E59/4 Very active headscarp in till (Partly Active)



E59/3 lower cliff subject to marine erosion and cliff top actively receding (Partly Active)



E59/3 ongoing recession of cliff top through old road (Partly Active)



E59/2 fresh failures within the till (Partly Active)



E60/1b ongoing rockfall from lower cliff and localised failures of overlying till (Partly Active)

Coast Protection Asset Condition Assessment

Although the NFCDD records show no specific coastal defence assets within this area there are two sections of rock armour that give some protection to the cliff toe adjacent to the pinch points next to the cottages on Cowbar Lane, constructed as part of the 2002 scheme at Staithes harbour. The rock armour was in fair condition, similar to that observed in 2012, and appears to comprise a mixture of imported granite and smaller locally sourced rock. The crest level is relatively low and the length of cliff protected short, so appears to be designed as an adaptive measure to slow the rate of erosion locally.



Eastern section of rock armour at cliff toe next to Cowbar lane Photo taken 12/09/2014 (Asset Ref No. 1221D901D0401C01)



Western section of rock armour at cliff toe next to Cowbar lane Photo taken 12/09/2014 (Asset Ref No. 1221D901D0401C01)

4. Comparison with Previous Assessments

Coastal Slope Condition Assessment

The previous cliff condition assessment undertaken in summer 2012 and the post-December 2013 storm surge assessment are available for comparison with this inspection. The majority of CBUs along this stretch of coastline have not changed significantly since the previous survey (whether that was summer 2012 or December 2013) and their activity status is unchanged. However, there have been some areas of notable change.

Unit E52/2 at Saltburn has been downgraded in status to dormant as there is no substantial evidence of instability in this unit and it is defended at its toe by the road, car park and associated defences in its seaward facing part. However, the presence of the stream at its base on its eastward facing part is a potential future cause of erosion and attention should be given to any erosion at the toe of the cliff that this stream may cause.

Units E55/3 at the northern end of Cattersty Sands has been increased from Locally Active to Partly Active as exposed till subject to mudsliding and rilling is visible in a large proportion of the cliff's height. E57/6 and at Hummersea has been upgraded to Partly Active as much of the cliff shows signs of marine erosion and rockfall and there are localised failures in the till of the upper cliff. E57/1 at the eastern end of Hummersea bank has also been upgraded as the majority of the cliff is subject to active erosion although there is little evidence of recent cliff top recession.

Coast Protection Asset Condition Assessment

The previous coastal defence asset condition inspection was undertaken in the autumn of 2012. For a number of the assets changes have been noted in the relevant parts of Section 3 of the report and photographs from 2012 included where appropriate for comparison.

The maps showing the coastal defence asset overall condition in Appendix B have symbols overlaid to indicate assets that have improved or deteriorated in overall condition. Although there was evidence of localised repairs in many locations, in most cases the changes were not significant enough for the overall condition grading to alter. A short summary of changes is given below

The South Gare breakwater (Asset Ref No 1221C901C0506C01) remains in poor condition and despite further recent patchwork repairs is still deteriorating.

At Redcar main seafront the coastal defence improvement scheme was nearing completion at the time of the 2012 inspection and so has been in place for nearly two years. The defences were in very good condition apart from a short length at the cinema building which encroaches onto the beach and has not been included in the scheme.

There have been significant numbers of repairs to the assets at Saltburn-by-the-Sea, including repairs to the beach access ramps and blockwork revetments since the December 2013 storm, but no asset had changed significantly enough from the 2012 inspection for the condition grade to be improved or lowered, see Map 2 in Appendix B.

At Skinningrove the old jetty is continuing to deteriorate and has been assessed as being in Condition Grade 4 (Poor), since 2008.

The low beach levels in front of Skinningrove village were very low at the time of the 2012 inspections, exposing the toe of the rock armour defence north of the village (Asset Ref. No. 1221D901D0202C01) to scour. The beach was higher during the July 2014 inspections and only a short length of the toe was visible. The fishtail groyne (Asset Ref. No. 1221D901D0202C05) has suffered further storm damage with localised displacement of armour but remains in fair condition. Although repairs had been undertaken to the crest of the seawall to the east of Skinningrove (Asset Ref. No. 1221D901D0202C03), the toe remains

undercut due to foreshore lowering and the Condition which was downgraded in 2012 remains Poor.

In addition as noted in 2010 and 2012, the rock armour and sea wall defences along the watercourse seaward of the bridge at Skinningrove although in good condition appear low and may be easily overtopped by a high tide.

5. Problems Encountered and Uncertainty in Analysis

Coastal Slope Condition Assessment

Views of the lower part of the cliffs between units **E58/5 Lower** to **E58/1c** were sometimes limited. This is a result of the steep, complex terrain of the former quarries. At these locations, judgements about cliff behaviour activity status were made based on the visible cliff sections. Additional data will be derived from aerial survey data collected as part of Cell 1 monitoring work during 2015.

Coast Protection Asset Condition Assessment

Very few problems were encountered on site during the asset condition assessment. Access issues posed the largest potential problems although most assets were located in public spaces and were easily accessible with due consideration and planning around tides. In several location the beaches were higher than in 2012, obscuring lower parts of the structures. However these issues are not considered to have affected the quality of the assessment.

6. Conclusions and Recommended Actions

Findings for Coastal Slopes

It is recommended that monitoring of the entire frontage should be continued regularly by interpretation of data collected by aerial survey under the Cell One programme and the next planned walkover inspection in 2014.

Activity levels remain high for most of this stretch of coastline. As a result it is recommended that the entire frontage be regularly inspected. Areas of particular concern are located at units E54/3a and in the vicinity of E59/3. The former is where the railway line runs extremely close to the cliff edge around Warsett Hill. The latter is classified as Partly Active and is where parts of the abandoned Cowbar Lane are being lost to erosion and failure. Close monitoring of the cliff top position near to the buildings at Boulby Grange (E58/1a) would also be beneficial given the proximity of the headscarp to the footpath here.

Findings for Coast Protection Assets

The grading of all defences and structures have been assigned using the Environment Agency asset condition assessment guidelines.

The table in Appendix B includes a summary listing of the defence inspection results for each asset including all of the recommendations that have been made. Note that the "Urgency" and "Residual Life" are NFCDD asset descriptors. Urgency categories within NFCDD are: Routine, Urgent and No Repairs. Residual life categories are: <1, 1-5, 6-10, 11-20 and >20 years and are based on visual inspection only.

The defences that may warrant most urgent attention due to their poor condition and potential risks to assets are the wall at the east side of Skinningrove and the defences to the west of Redcar that were not included in the recent capital scheme.

For detailed comments on asset construction and condition, as well as many more photos of the defences and locations refer to the accompanying SANDS database viewer NFCDD asset inspection records for each area.

Two-yearly walk-over inspections are recommended to continue into the future to assess ongoing deterioration and coastal erosion, as well as the performance of general repairs and the new capital scheme at Redcar.

Appendix A

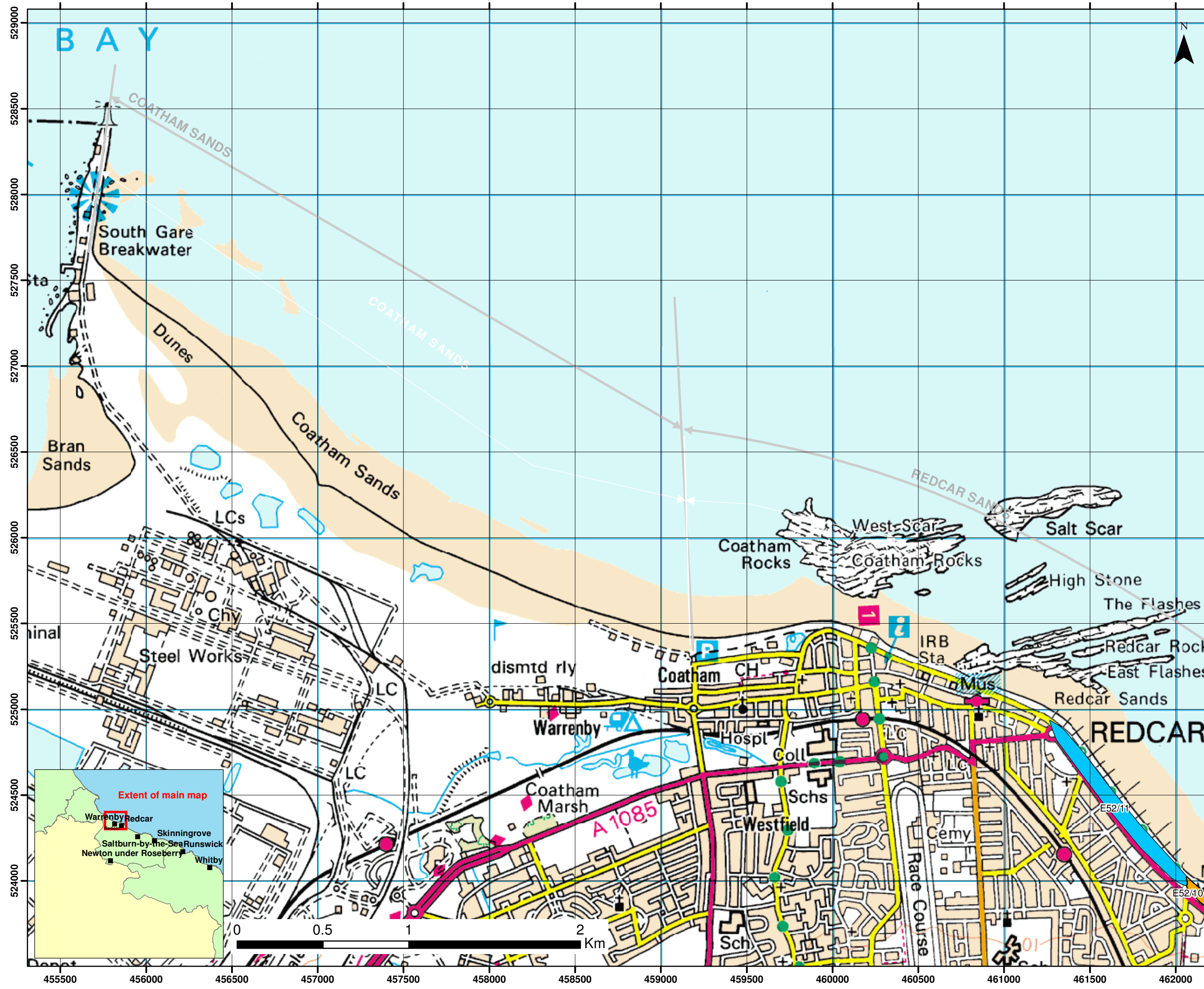
Coastal Slope Condition

Maps 1 – 4

UNIT	2002	2005	2008	2010	2012	2013 post-surge	2014
E52/1	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Inactive	Inactive
E52/2	Not Inspected	Not Inspected	Inactive	Inactive	Inactive	Inactive	Dormant
E52/3a	Not Inspected	Not Inspected	Inactive	Inactive	Inactive	Inactive	Inactive
E52/3b	Not Inspected	Not Inspected	Inactive	Inactive	Inactive	Inactive	Inactive
E52/4	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active
E52/5	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Inactive	Locally Active	Locally Active
E52/6	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Inactive	Inactive	Inactive
E52/7	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Dormant	Dormant	Dormant
E52/8	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Locally Active	Locally Active	Locally Active
E52/9	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Locally Active	Inactive	Inactive
E52/10	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Locally Active	Partly Active	Partly Active
E52/11	Not Inspected	Not Inspected	Not Inspected	Not Inspected	Inactive	Dormant	Dormant
E53/1	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E53/2	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E53/3	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Locally Active	Locally Active
E53/4	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Partly Active	Partly Active
E53/5	Not Inspected	Not Inspected	Dormant	Dormant	Locally Active	Locally Active	Locally Active
E54/1	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E54/2a	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E54/2b	Not Inspected	Not Inspected	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active
E54/3a	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E54/3b	Not Inspected	Not Inspected	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active
E54/4	Not Inspected	Not Inspected	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active
E55/1	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E55/2	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E55/3	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Partly Active

UNIT	2002	2005	2008	2010	2012	2013 post-surge	2014
E56/1	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E56/2a	Not Inspected	Not Inspected	Inactive	Inactive	Locally Active	Not Inspected	Locally Active
E56/2b	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E57/1	Not Inspected	Not Inspected	Partly Active	Partly Active	Locally Active	Not Inspected	Partly Active
E57/2	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E57/3	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E57/4	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E57/5	Not Inspected	Not Inspected	Partly Active	Locally Active	Locally Active	Not Inspected	Locally Active
E57/6	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Partly Active
E57/7	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/1a	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/1b	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/1c	Not Inspected	Not Inspected	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active
E58/6	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E58/2 Lower	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/2 Upper	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E58/3 Lower	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/3 Upper	Not Inspected	Not Inspected	Partly Active	Partly Active	Locally Active	Not Inspected	Locally Active
E58/4 Lower	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/4 Upper	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E58/5 Lower	Not Inspected	Not Inspected	Locally active	Partly Active	Partly Active	Not Inspected	Partly Active
E58/5 Upper	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E59/1	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E59/2	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E59/3	Not Inspected	Not Inspected	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active
E59/4	Not Inspected	Not Inspected	Partly Active	Totally Active	Partly Active	Not Inspected	Partly Active

UNIT	2002	2005	2008	2010	2012	2013 post-surge	2014
E59/5	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E59/6	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E59/7	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E59/8	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active
E59/9	Not Inspected	Not Inspected	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active
E60/1a	Not Inspected	Not Inspected	Locally active	Totally Active	Totally Active	Totally Active	Totally Active
E60/1b	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
MU4/1a	Dormant	Partly Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active



KEY

2014 Classification

- Totally active
- Partly active
- Locally active
- Inactive
- Dormant
- Not inspected 2014

2013 Classification

- Dormant
- Inactive
- Locally active
- Partly active
- Totally active
- Not inspected Dec 2013

Change to 2014

- Increase in status
- Decrease in status
- No change

Notes:

Centre colour = 2014 classification
 Border colour = 2013 classification
 Hashing = change from previous inspection (December 2013 or Autumn 2012)

— — Management unit

Client: North East Coastal Group
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 1
 Cliff and Natural Asset
 Activity**

**Redcar & Cleveland
 Borough Council**

2014 Coastal Inspection


 Halcrow Group Ltd, Lyndon House, 62 Hagley Road, Edgbaston, Birmingham, B16 8PE
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KEY

2014 Classification

- Totally active
- Partly active
- Locally active
- Inactive
- Dormant
- Not inspected 2014

2013 Classification

- Dormant
- Inactive
- Locally active
- Partly active
- Totally active
- Not inspected Dec 2013

Change to 2014

- Increase in status
- Decrease in status
- No change

Notes:

Centre colour = 2014 classification
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 Hashing = change from previous inspection (December 2013 or Autumn 2012)

— Management unit

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 2
Cliff and Natural Asset Activity**

Redcar & Cleveland Borough Council

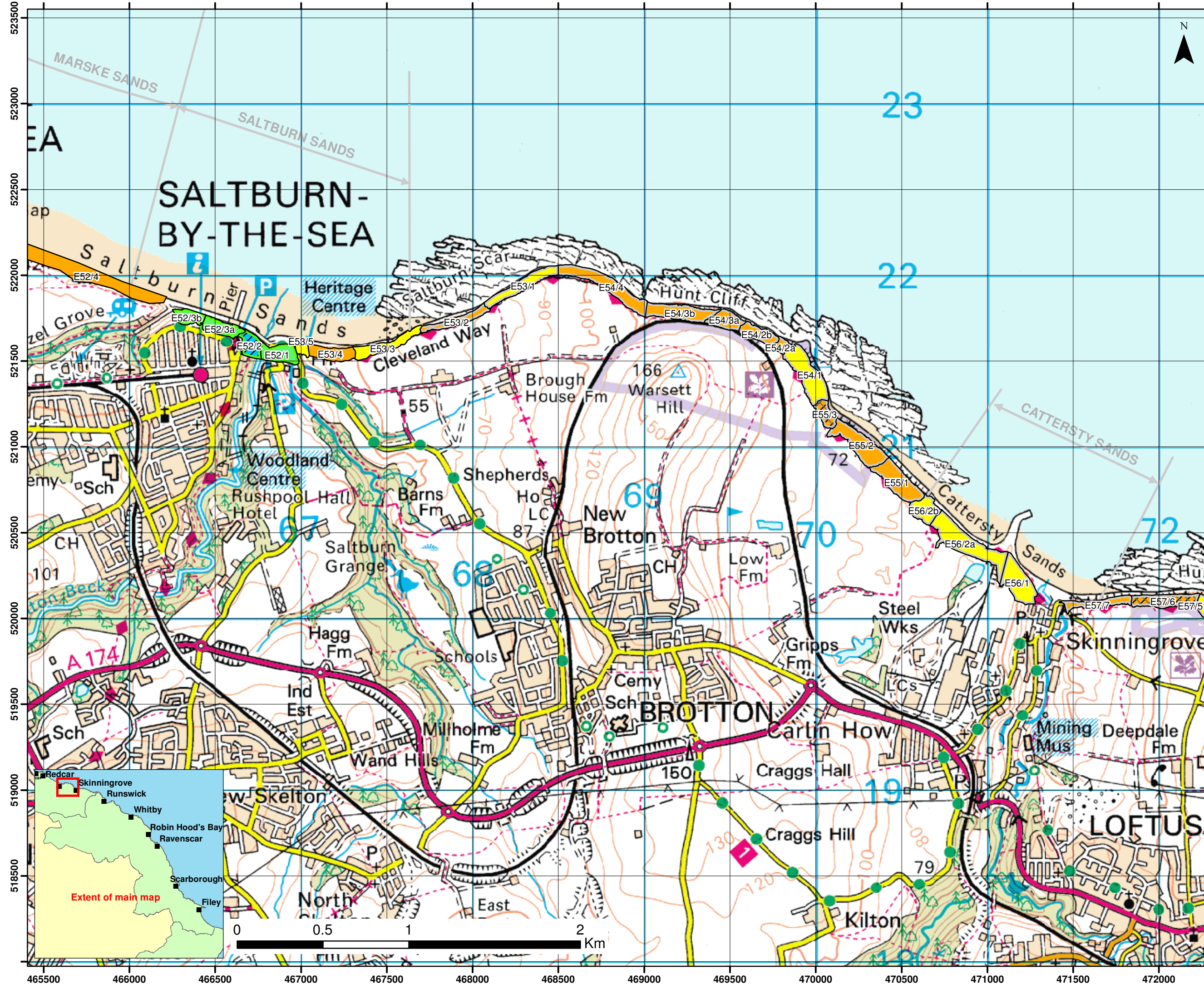
2014 Coastal Inspection

CH2MHILL
Halcrow

Halcrow Group Ltd, Lyndon House, 62 Hagley Road, Edgbaston, Birmingham, B16 8PE

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KEY

2014 Classification

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- Inactive
- Dormant
- Not inspected 2014

2013 Classification

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- Inactive
- Locally active
- Partly active
- Totally active
- Not inspected Dec 2013

Change to 2014

- Increase in status
- Decrease in status
- No change

Notes:

- Centre colour = 2014 classification
- Border colour = 2013 classification
- Hashing = change from previous inspection (December 2013 or Autumn 2012)
- Management unit

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

Map 1
Cliff Activity

Redcar & Cleveland Borough Council

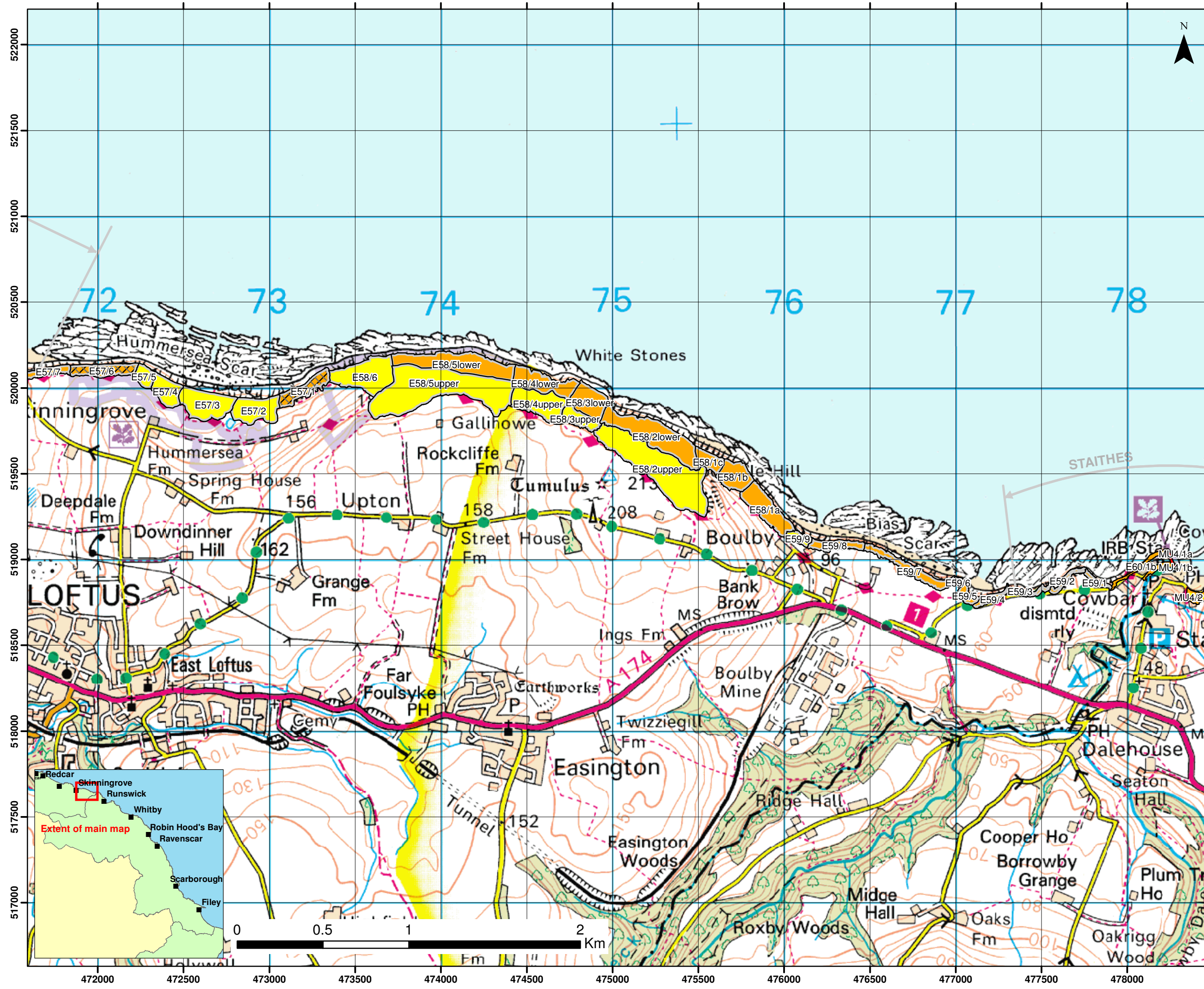
2014 Coastal Inspection

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KEY

2014 Classification

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- Inactive
- Locally active
- Partly active
- Totally active
- Not inspected Dec 2013

Change to 2014

- Increase in status
- Decrease in status
- No change

Notes:

- Centre colour = 2014 classification
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- Hashing = change from previous inspection (December 2013 or Autumn 2012)
- Management unit

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 2
Cliff Activity**

**Redcar & Cleveland
Borough Council**

2014 Coastal Inspection

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Appendix B

Coast Protection Asset Condition

Maps 1 to 4

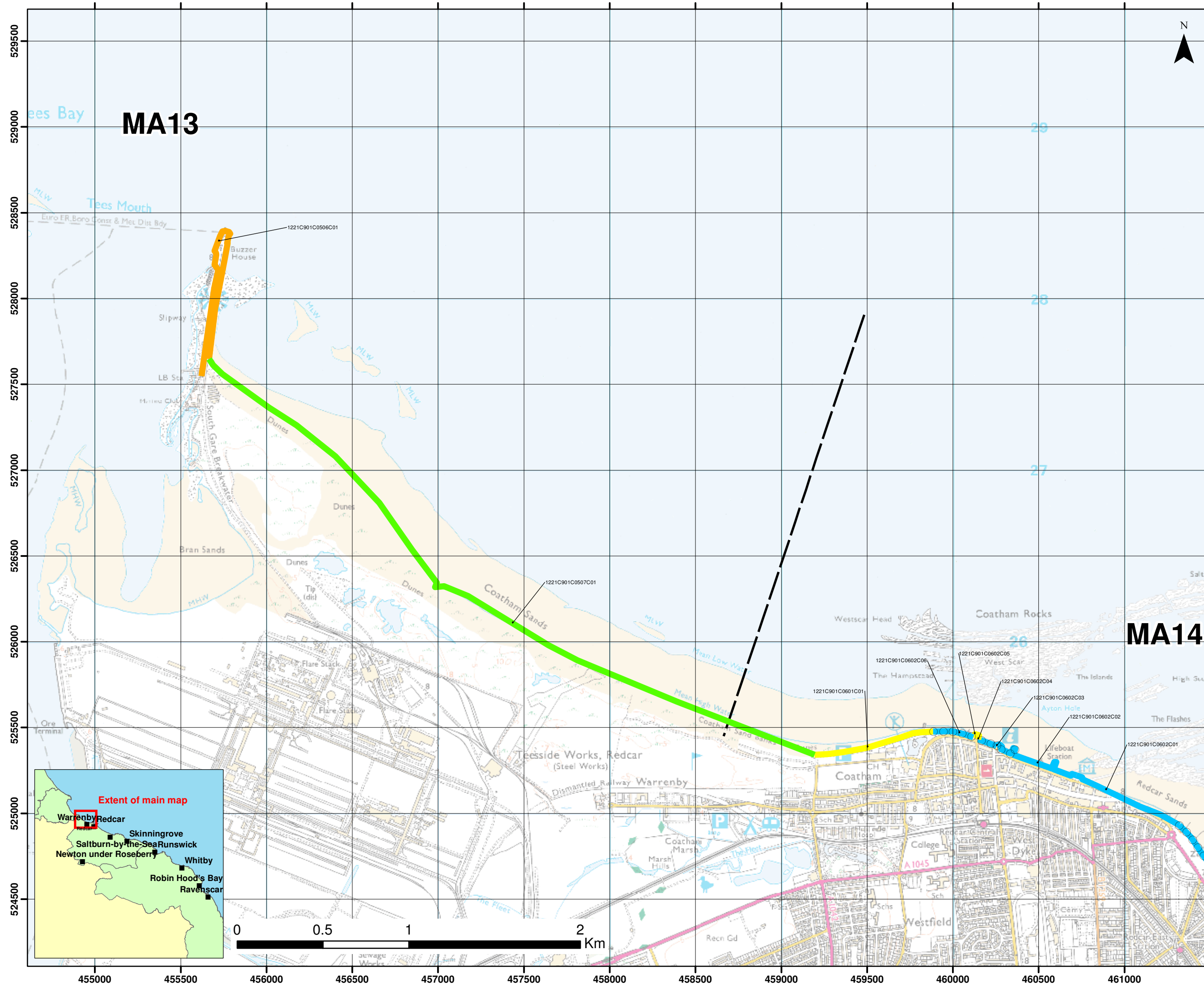
Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspect Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
1221C901C0506C01	CPSE-220/6601/03	South Gare Breakwater. Protects Coatham Sands to south and Tees entrance to north.	Apron	NZ55622754, NZ55762839	1672.5	24/07/2014	Although structure remains in poor overall condition, it continues to function in protection of the nav channel and control of bay to south. Evidence of recent repairs to grouted revetment on west and concrete deck slabs on south side.	4	4	11 - 20	Continue with patch repairs.	routine
1221C901C0507C01		Undefended	Undefended	NZ55662764, NZ59192534	4330.2	24/07/2014	Good coverage of established vegetation. Evidence of toe erosion to vegetation, but has accreted. Local erosion due to trampling, especially at S end where there is a high but v narrow dune ridge at N end of car park (rolling back over fence).	2	3	>20	Monitor with LiDAR and aerials.	routine
1221C901C0601C01	CPSE-220/6602/02	Concrete crest wall above part length of grouted stone revetment.	Wall	NZ59192534, NZ60042546	861.5	24/07/2014	In front of car park crest wall is concrete and generally fair condition, with grouted stone revetment. 2m section of crest wall missing towards northern end. Number of missing blocks and damaged areas to revetment.	3	4	11 - 20	Replace missing blocks and mortar; repair missing concrete wall at north end.	routine
1221C901C0602C01	CPSE-220/6607/02	Concrete toe to revetment.	Apron	NZ60712522, NZ61092503	559.2	24/07/2014	New stepped seawall and precast wave wall at crest constructed in 2012 - as new condition.	1	1	>20	Monitor new defences	routine
1221C901C0602C02	CPSE-220/6606/02	Concrete revetment below concrete seawall.	Revetment	NZ60352534, NZ60712522	480.7	24/07/2014	New defences in 2012. Stepped seawall with wave wall at crest. As new cond. Localised damage to surfacing of the main lifeboat slipway.	1	1	>20	Repair defects in slipway surfacing	routine
1221C901C0602C03	CPSE-220/6605/01	Stepped seawall to main sea frontage.	Wall	NZ60252539, NZ60362537	206.4	24/07/2014	Concrete steps in v good condition. Reconstructed in 2012. Vertical wall around the Beacon tower, then stepped revetment to the slipway. As new condition. Graffiti on seaward face.	1	1	>20	Continue to monitor	no repairs
1221C901C0602C04	CPSE-220/6604/01	Former concrete promenade shelter, now has voids infilled with brick work (internal structure unknown).	Wall	NZ60142543, NZ60252539	113.9	24/07/2014	As new stepped concrete revetment and wave wall, constructed in 2012. No significant defects observed.	1	1	>20	Monitor	routine
1221C901C0602C05	CPSE-220/6626/01	Massive concrete wall to rear of cinema. Crest level reduces towards shore.	Wall	NZ60112544, NZ60152545	68.7	24/07/2014	Old defences around former pier / cinema building. Defences in poor to fair condition, with cracks and undermining of toe apron to N corner.	3	3	11 - 20	Infill cracks repair / replace toe apron	no repairs
1221C901C0602C06	CPSE-220/6603/01	Rough concrete revetment over old 1890's slag revetment.	Revetment	NZ60042546, NZ60112544	82.1	24/07/2014	The new revetment and cest wall is in as new condition. Graffiti was being high pressure washed from the seaward face.	1	2	>20	monitor	routine
1221C901C0603C01	CPSE-220/6609/03	Grouted masonry revetment in front of promenade & The Stray. Concrete splash wall landward of promenade. Accretion of sand & dunes behind.	Splash Wall	NZ62062403, NZ61212497	1273	24/07/2014	New defences in as new condition. Block revetment tied to concrete prom. Groynes repaired with 2012 scheme have missing planks in places, partic seaward ends.	1	2	11 - 20	Monitor scheme performance. Repair groynes.	routine

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspect Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
1221C901C0701C01		Undefended Frontage	Undefended Frontage	NZ62062403, NZ63482300	1765.3	24/07/2014	As 2012: Condition varies - active erosion in north, but further south wider cobble beach affords some protection and the cliff is largely vegetated.	3	4	11 - 20	Continue monitor with aerials and LIDAR	routine
1221C901C0702C01	CPSE-220/6612/01	Brick wall enclosure of boat park and access. Short length of concrete wall with lower crest level.	Wall	NZ63562281, NZ63602290	97.2	24/07/2014	As last inspect, wall in fair cond. Seaward end missing bricks/mortar, will reduce integrity of structure. Local scour to rear. Settlement cracks from crest to base. Landward concrete wall fair condition, but several vertical cracks from crest to base.	3	3	11 - 20	Repoint masonry. Fill cracks. Tidy seaward end of wall. Replace missing bricks.	routine
1221C901C0702C02	CPSE-220/6611/01	Masonry revetment to path and coastal slope above masonry wall. Coastal slope with access to properties above.	Revetment	NZ63562281, NZ63572293	122.2	24/07/2014	Repairs evident on landward toe retaining wall. Extensive vegetation growth on revetment slope. Toe wall appears fair where exposed. Seaward section largely covered by sand and vegetation.	3	4	11 - 20	Repoint wall, clear vegetation. Replace missing blocks/infill locally.	routine
1221C901C0702C03	CPSE-220/6610/01	Lower masonry wall to path. Upper wall varies (concrete/masonry), coastal slope to rear.	Wall	NZ63482300, NZ63572293	125.9	24/07/2014	High beach levels covering much of lower wall. Missing mortar near steps and where exposed. Missing coping blocks at N. Evidence of minor movement of rear wall at several full height cracks. Beach and dunes seem to be accreting in front of wall.	3	3	11 - 20	Repair cracks, replace missing blocks; monitor lateral movement of upper wall	routine
1221C901C0702C04		Undefended Frontage	Undefended Frontage	NZ63602290, NZ64502254	1011.6	24/07/2014	Low accreting dunes in front of mostly vegetated cliff.	2	3	>20	Inspect in 2016	routine
1221C901C0703C01		Undefended Frontage	Undefended Frontage	NZ64502254, NZ66232182	1883.2	24/07/2014	Partly active, HWM at cliff toe in south. Highly vegetated, but many minor local failures and slumping.	4	4	>20	Monitor with LIDAR and aerials.	routine
1221C901C0703C02	CPSE-220/6613/01	Concrete wall including outfall and two concrete slipways to coastal slope.	Wall	NZ66232182, NZ66262182	46.8	24/07/2014	Overall in a fair condition, some minor cracking and spalling visible although stable. Some cracking to side walls of ramp to S, missing coping at top of S ramp.	3	3	>20	Repair cracks if they worsen. replace missing coping stones.	routine
1221C901C0704C01	CPSE-220/6615/01	661501 Large masonry block revetment protecting carpark, road and coastal slope. Masonry slipway is also present.	Revetment	NZ66652170, NZ66812158	65.8	24/07/2014	Generally sound. No missing blocks. Most mortar joints in good condition, but a few have been washed out, repairs evident. Steps have been repaired since 2012 but mortar under treads washing out.	2	2	>20	repointing.	routine
1221C901C0704C02	CPSE-220/6616/01		Carpark.	NZ66812158, NZ66852159	35.7	24/07/2014	Undefended section at fishing boat park. Some erosion of cobble beach at edge of car park surfacing.	3	3		Continue monitoring and reprofile shingle if necessary.	
1221C901C0704C03	CPSE-220/6617/01	661701 White rendered sea wall set back from the beach, cobbles have collected on the seaward side protecting the toe. Boat handling area, carpark and PH located behind. Slipway is also present giving access to the beach.	Wall	NZ66852159, NZ66952160	106.8	24/07/2014	Rendered wall at road side in fair/good condition, some loss of render and cracks. Protected by high cobble beach. Slipway at E end has been fully repaired with new surfacing since 2012.	2	2	11 - 20	Monitor.	routine

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspect Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
1221C901C0704C04	CPSE-220/6614/01	Masonry wall in good condition, generally high sand with shingle to east end. Concrete splash wall to rear of promenade below coastal slope.	Sea Wall	NZ66262182, NZ66652170	415	24/07/2014	Evidence of recent repointing and repairs to coping replacing missing mortar noted in 2012. Promenade sound. Slipways blocks have all been repointed. Shingle beach level higher north of pier. Cracking in r wall. Cliff shows signs of localised slumps.	2		3 >20	Repair coping and monitor pointing for more repairs	routine
1221C901C0704C05	CPSE-220/6618/01	661801 Various concrete and masonry walls to private property with various degrees of concrete apron with typical level of 4.7 mODN.	Wall	NZ66952160, NZ67072160	118.6	24/07/2014	Superficial repairs undertaken recently with poured concrete placed at S end, although this is becoming undercut already.	4		4 1 - 5	Rock armour at S end to soften interface with eroding cliff	urgent
1221C901C0704C06	CPSE-220/6615/01	Concrete blockwork seawall protecting pavement, handrail and tarmac road. This section also includes bridging point over river, continuation of sea wall on the southern side.	Sea Wall	NZ66652170, NZ66812158	147.1	24/07/2014	Concrete blockwork wall, joint washout and cracking visible, short section of coping stone missing. Vegetation growth present. Pavement and road in a good condition. High beach profile protecting toe of wall.	3		3 >20	Replace missing coping stones at rear of path by road	routine
1221D901D0101C01		High cliffs are locally active above beach east of Saltburn. Cliffs much more active (partly/totally active) along Hunt Cliff above shore platform, specifically where railway nears cliff edge. Further east, cliffs are less high and locally active.	Undefended high cliffs.	NZ67072160, NZ70142118	3551.2							
1221D901D0201C01		Cliffs to NW partly active, slumping of soft upper slopes, erosion of harder lower cliff, some veg. Cliffs to SE support more veg, small dune system at toe, less active (locally active/inactive).	Undefended high cliffs.	NZ70142118, NZ71112040	1262.3	24/07/2014	Slip visible in distance from Skinninggrove Jetty Partly Active.					
1221D901D0201C02	CPSE-220/6619/01	661901 Old concrete jetty. A short section of steel sheet piling is also incorporated into construction. Was last in use when local mining was active.	Breakwater	NZ71112040, NZ71262059	477	24/07/2014	As 2012 survey: Derelict concrete jetty. Significant missing collapsed sections. Slab nr landward end is lifted as a result of wave action. Piling is corroded through, fixings are falling. Whole defence is in disrepair. Still stabilises bay.	4		4 1 - 5	Re-secure gates to prevent public access.	routine
1221D901D0202C01	CPSE-220/6620/01	662001 Rock armour slope with 150 ballast behind. To path and coastal slope. Control to erosion of village.	Armour	NZ71282016, NZ71142043	305.1	24/07/2014	Rock armour in a fair condition, rocks still give good coverage and are packed tightly. Beach higher than in 2012, toe only exposed at S end. Crest rubble has been displaced by overtopping, recent work to reprofile evident. slip on cliff behind track.	3		3 >20	Continue to monitor.	routine
1221D901D0202C02	CPSE-220/6621/03	662103 Masonry wall behind rock revetment, severely overtopped prior to breakwater and beck control works.	Wall	NZ71382002, NZ71282016	182.3	24/07/2014	Rock armour in fair to good cond, but some gaps in coverage. Cobble beach has grown landward of spur groyne. Blockwork wall also in good condition, stable and vertical. Geotextile exposed on toe of spur groyne at seaward end due to low beach..	3		3 >20	Continue active monitoring.	routine
1221D901D0202C03	CPSE-220/6623/01	662301 Concrete wall in moderate condition to end of protection offered by breakwater. Protects road.	Wall	NZ71412009, NZ71472010	60.5	24/07/2014	As 2012: Toe still undermined, but promenade has been repaired and rear retaining wall shored up - appear to be holding but wall at risk of collapse due to undermining.	4		4 1 - 5	Repair toe undermining.	urgent
1221D901D0202C04		Beach frontage with cobbles and boulders located at beach of beach giving protection to soil embankment and fishing area.	Beach frontage.	NZ71412009, NZ71372016	77.1	24/07/2014	Rock armour at top of cobble beach protecting boat park in fair to good condition. Cobble beach level is quite high and slopes down gently to sea..	2		3 >20	Continue to monitor.	routine

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspect Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
1221D901D0202C05	CPSE-220/6622/01	662201 Offshore fishtail breakwater protecting frontage and stabilizing beach levels. Concrete slipway also included in defence providing access for fishermen. Highground is natural main land.	Breakwater	NZ71392004, NZ71372024	450.4	24/07/2014	Fishtail breakwater in fair to good condition, signs of rock armour having been displaced locally, leaving loosely packed areas, but still serving purpose. Missing top of navigation marker . Concrete slipway has been repaired.	3	3	>20	Repair nav mark. monitor armour, reprofile in future.	routine

Condition worse than last inspection
Condition better than last inspection



KEY

— Management Unit

Asset condition (2014)

- Very good
- Good
- Fair
- Poor
- Very poor

Asset condition change

- Improvement since 2012
- Worsened since 2012

Client: North East Coastal Group
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 1
 Coast Protection Asset
 Condition 2012**

**Redcar & Cleveland
 Borough Council**

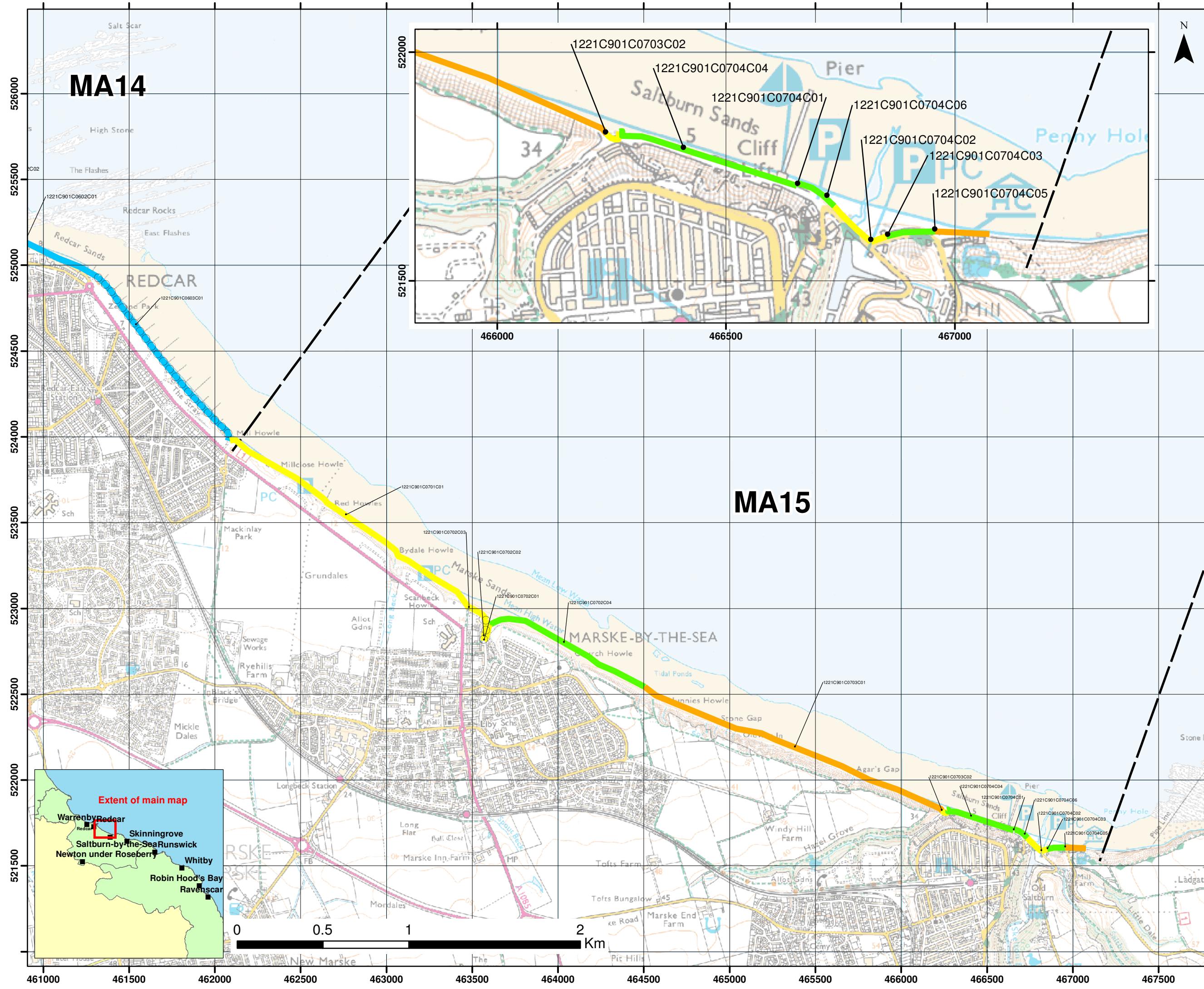
2014 Coastal Inspection

CH2MHILL
 Halcrow

Halcrow Group Ltd, Lyndon House, 62 Hagley Road, Edgbaston, Birmingham, B16 8PE

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KEY

--- Management Unit

Asset condition (2014)

- Very good
- Good
- Fair
- Poor
- Very poor

Asset condition change

- Improvement since 2012
- Worsened since 2012

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

Map 2
Coast Protection Asset
Condition 2014
Redcar & Cleveland
Borough Council

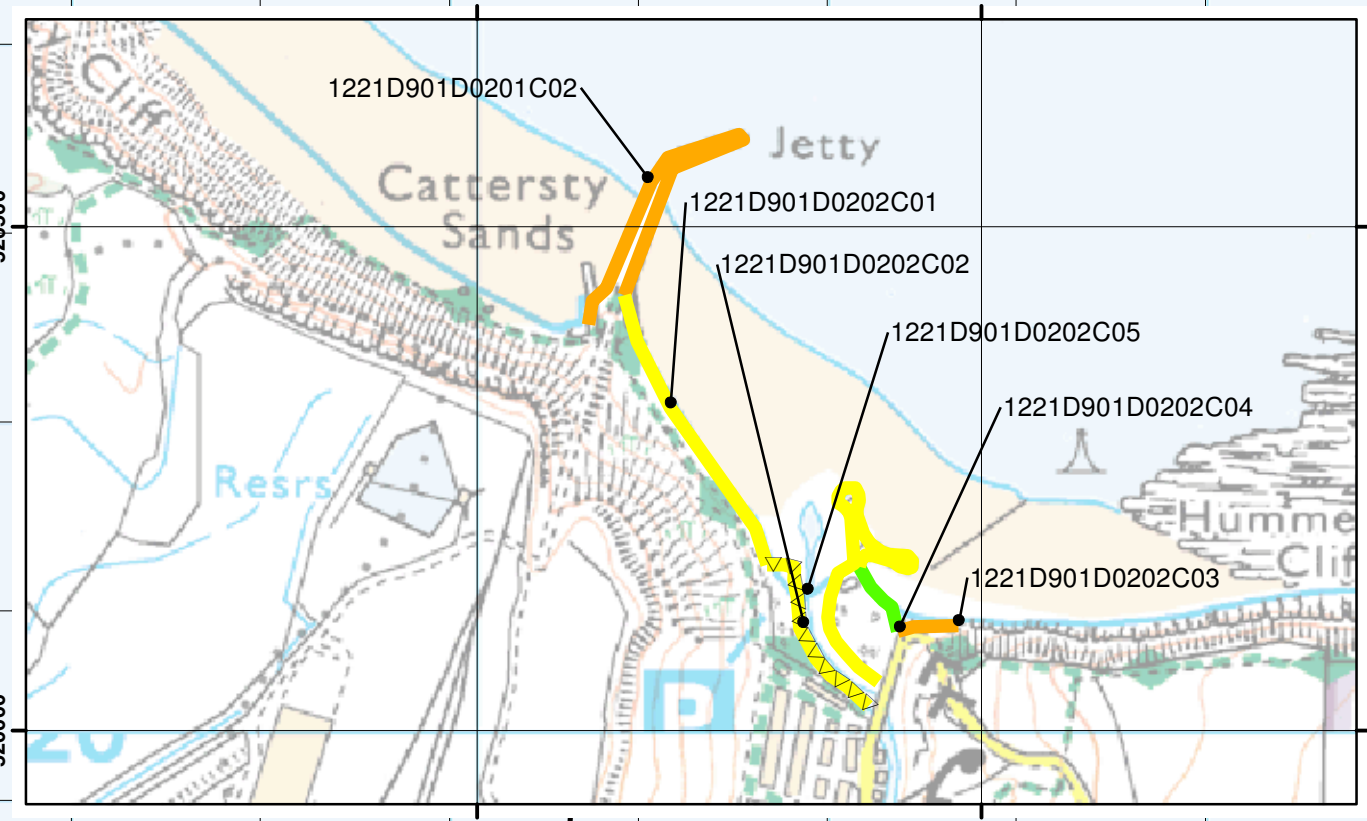
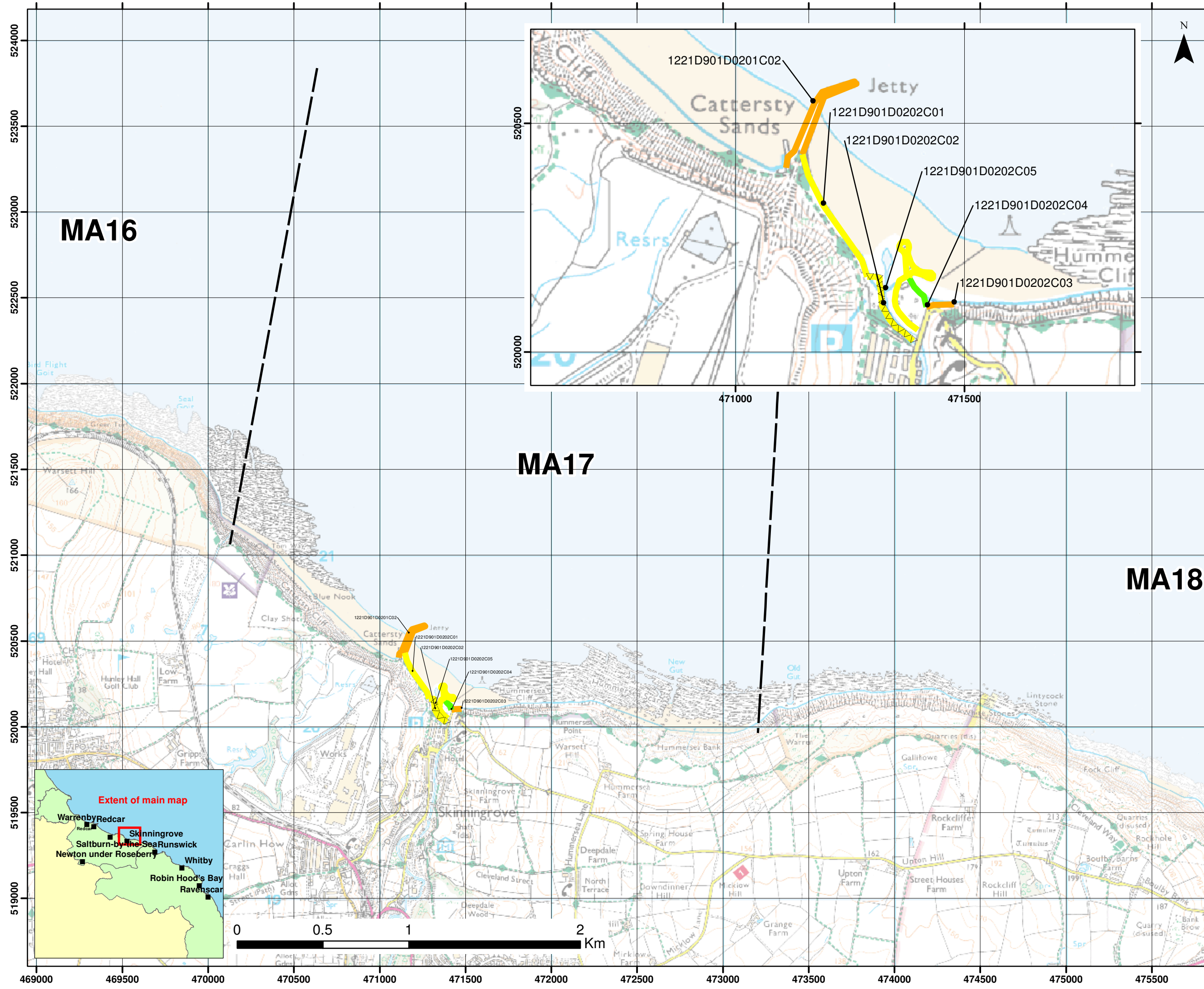
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Asset condition (2014)

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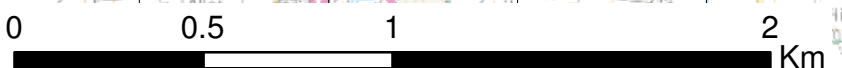
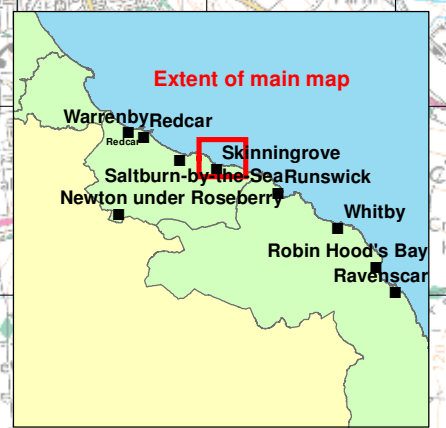
Asset condition change

- Improvement since 2012
- Worsened since 2012

MA16

MA17

MA18



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

Map 3
Coast Protection Asset Condition 2014

Redcar & Cleveland Borough Council

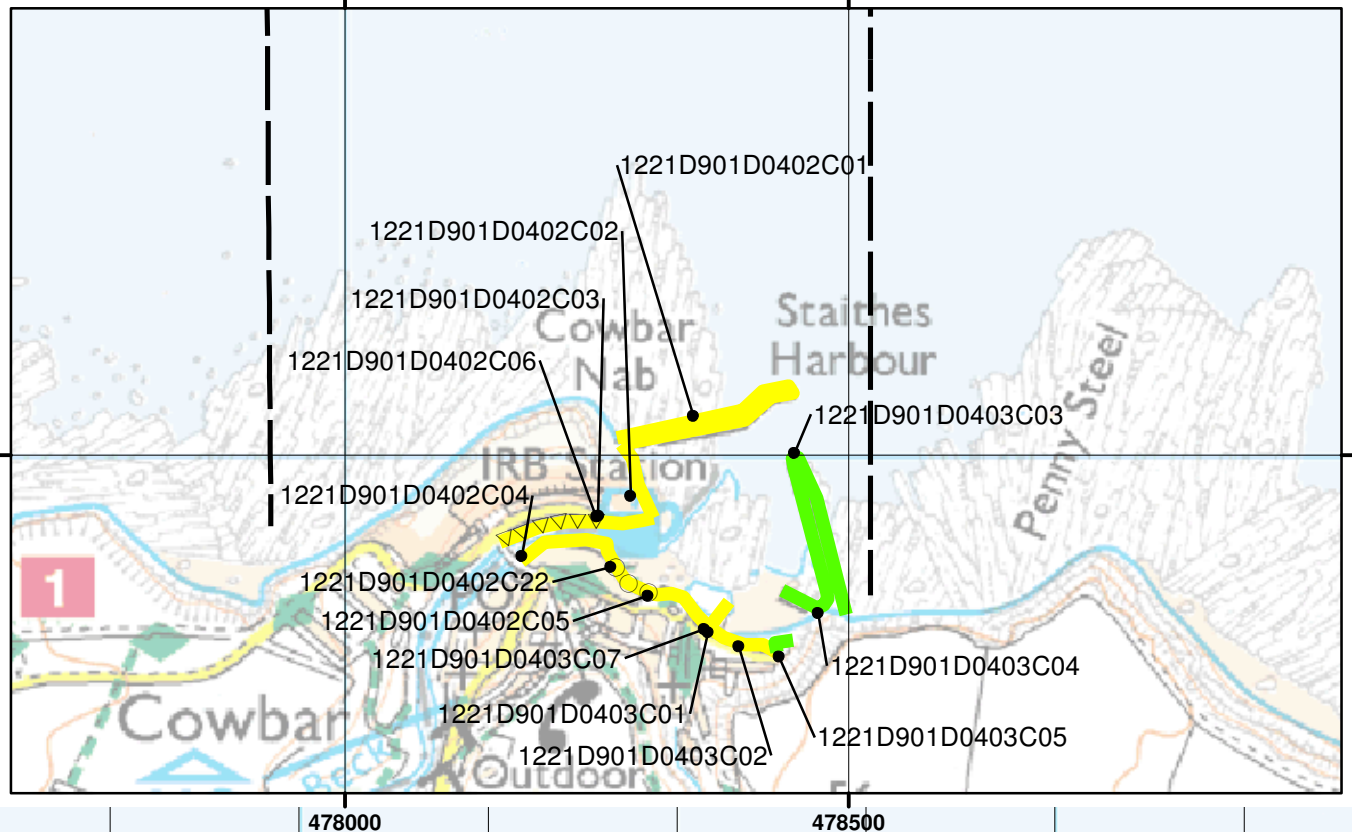
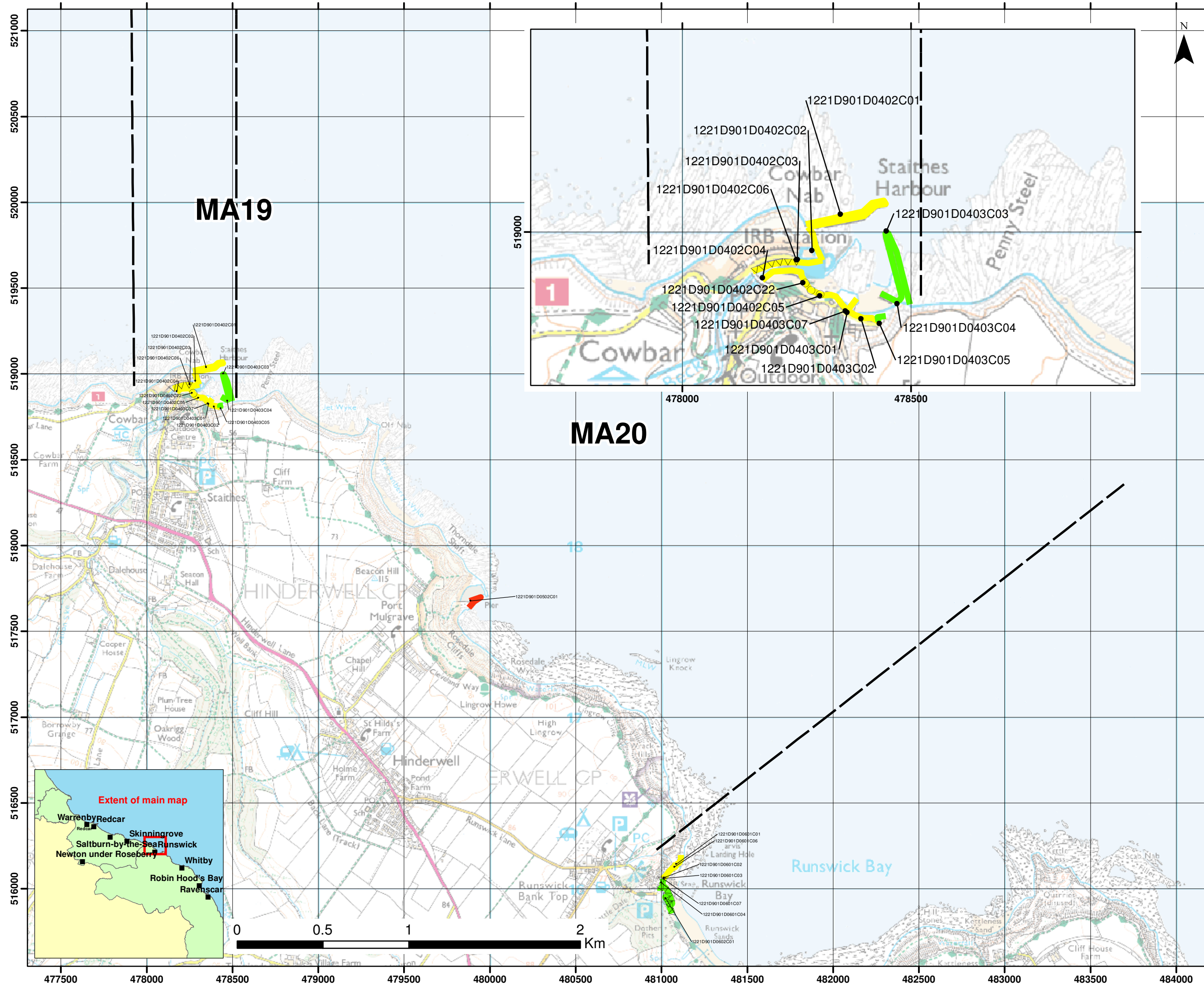
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KEY

--- Management Unit

Asset condition (2014)

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Asset condition change

- ○ ○ Improvement since 2012
- △ △ △ Worsened since 2012

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

Map 4
Coast Protection Asset
Condition 2014

Redcar & Cleveland
Borough Council

2014 Coastal Inspection

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